1994

Columbia River Basin

Fish and Wildlife Program

Overview

Northwest
Power Planning
Council

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Fish and Wildlife Program
Overview

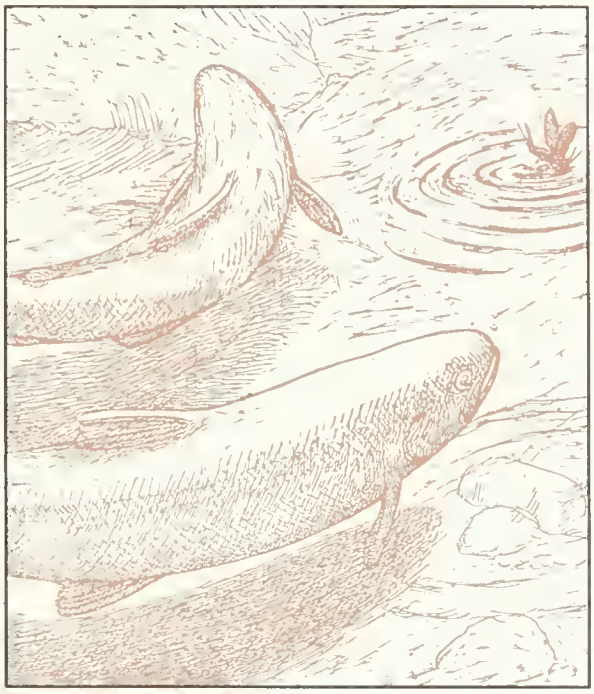
It falls to our generation to be more than river users.
We must be caretakers.

Northwest Power Planning Council
851 S.W. Sixth Avenue, Suite 1100
Portland, OR 97204-1348
January 1994

The Northwest Power Planning Council was established by an Act of Congress to develop a program to protect and enhance the Columbia Basin's fish and wildlife and a regional power plan that provides a reliable electricity supply at the lowest cost. For further information, see Pacific Northwest Electric Power Planning and Conservation Act—Public Law 96-501.

This document is a summary of the Northwest Power Planning Council's
1994 Columbia River Basin Fish and Wildlife Program.
Although we hope that this summary provides a helpful introduction to the measures in the program,
this document has not been formally adopted as part of the program and should not
be considered as amending or superseding the program.
The full text of the program, as adopted by the Council in rulemakings pursuant to
Section 4(H) of the Northwest Power Act, is available on request.
Ask for publication 94-2.

A Challenge in the Columbia



No single element of the Pacific Northwest landscape is more critical to this region's economic prosperity than the Columbia River and its vast watershed — an area covering 260,000 square miles.

Electricity from the Columbia's dams powers our homes, businesses and industries. Much of the bountiful agricultural industry of the Northwest depends on the Columbia's irrigation and on its barge lines to transport products to buyers. Commercial and recreational fishing is not only an industry, but also a culture along the Columbia and its tributaries. And thousands of Northwesterners use the Columbia and its tributaries for recreation.

The Columbia River Basin is also central to Native Americans in the region. Columbia River Basin salmon, for example, are intrinsic in the culture of many Northwest tribes.

All of that is part of the developed world — the human and cultural side — of the Columbia River Basin, and it is easy to think that's all that matters.

But there is also an undeveloped, natural world in the Columbia Basin. It is an immensely complex ecosystem — the setting for thousands of years of biological interactions that worked together to sustain life there.

Over the past hundred years or so, this ecosystem has been harnessed to serve development. From the perspective of many in the Northwest, there have been great benefits. The region prospered. But that prosperity cost the ecosystem dearly.

We are most familiar with the loss of salmon, our most potent symbol of endurance and vigor. Ironically, these fish are now among the region's most vulnerable species. A century ago, between 10 million and 16 million salmon and steelhead returned to the Columbia each year. Today, there are only about 2.5 million salmon, and most of those come from hatcheries.

We have lost not only numbers of fish, but whole runs and more than a third of their original habitat. Additional runs could disappear entirely, too. As recently as 1962, nearly 30,000 adult fall chinook salmon migrated past Ice Harbor Dam on the Snake River on their way to spawn. In 1993, the Snake River fall chinook count was just over 1,000 fish.

> Our goal is a healthy basin that supports both humans and fish and wildlife.

Other fish and wildlife species also suffered. Thousands of acres of prime wildlife habitat were flooded behind hydroelectric dams. Some fish — most notably sturgeon, which used to migrate up and down the Columbia and into the ocean — became landlocked.

Many species adapted to the developed Columbia River Basin. Others did not. Several species became extinct. Others have been listed on federal and state endangered species lists.

This Columbia River Basin Fish and Wildlife Program is designed to balance the needs of both the developed and the natural worlds within the watershed. It includes actions to protect and enhance salmon runs, as well as other fish and wildlife. Our goal is a healthy basin that supports both humans and fish and wildlife. We hope to make future Endangered Species Act listings of Columbia River Basin fish and wildlife unnecessary.

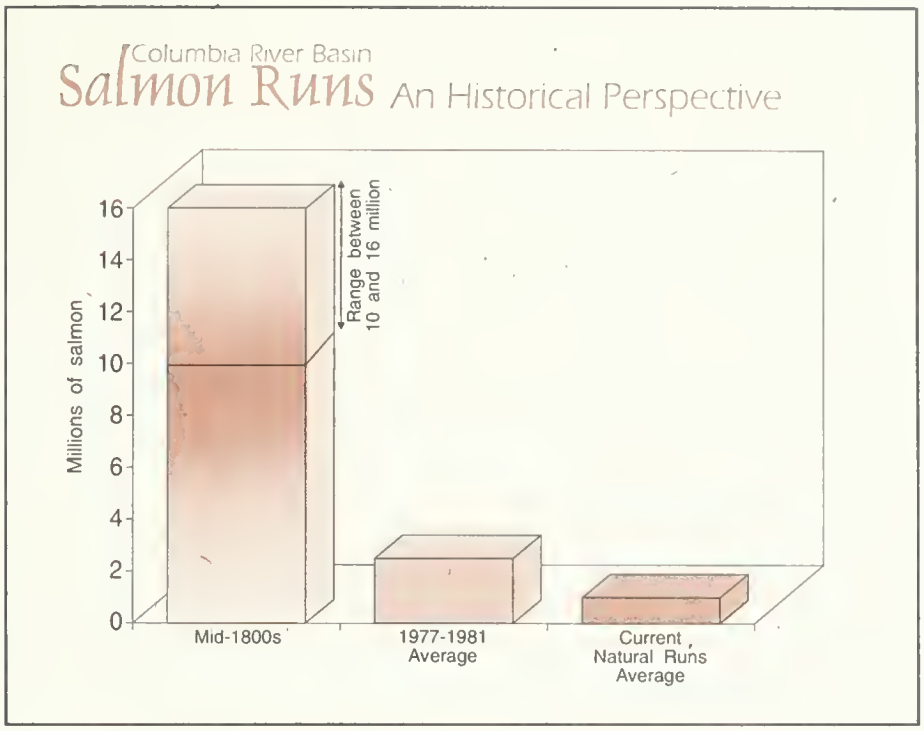
The Pacific Northwest Through Time

Evolution of a River Basin

13,000–10,800 B.C.
More than 40 floods scour much of the present day Pacific Northwest.

Clearly, a good deal of the Northwest's wilderness has long since disappeared. Cities and towns, farms and freeways have replaced forests and marshes, dry plains and shorelines. But fish and wildlife habitat still exists throughout the basin, and our goal is to protect it and enhance it, wherever we can.

The actions in this program, which are based on the best available scientific knowledge, are designed to accomplish this goal. Our approach follows Congress' guidance in the Northwest Power Act of 1980, upon which this program is based. The Act called for a systemwide approach to reverse the consequences to fish and wildlife of dam construction and operation.



Because of the urgency of the salmon's decline, and the listing of several salmon populations under the federal Endangered Species Act, we began our multiyear review of the program by addressing salmon protection. Our Northwest Congressional delegation and our four state Governors urged us to look at all the causes of the salmon's decline, not just the hydropower system. In 1992, we adopted our Strategy for Salmon, which is incorporated into the fish and wildlife program. The Strategy for Salmon is comprehensive both in its review of the problem and in its solutions.

In 1993, we revised our resident fish and wildlife measures. These new measures also stress a total watershed approach, calling for cooperation and coordination to sustain and increase surviving species in their habitat.

8,000 B.C.
Pacific Northwest Indians occupy the region, relying on salmon as a major source of food.

458 A.D.
Five Chinese Buddhist monks begin a voyage around the Pacific Rim, passing the mouth of the Columbia River some 1,334 years before Robert Gray "discovers" it in 1792.

ECOSYSTEMS

They're more complex than you think.

Nature is so complex. Nearly every element in a natural ecosystem plays a part in the endurance of that system. Knock one element out of its place, and there is a biological shuffle among all the other elements. It has been said that "ecosystems are not only more complex than we think, they are more complex than we *can* think."

River systems are no exception. The same river may flow through deserts and rain forests. It may stem from a lake on the side of a mountain, but cross marshes and pour into an ocean.

The complexity of our river systems has been magnified many times by the necessity to make rivers serve society. In today's world, rivers glide through, and even under, cities and towns. They are both the source of drinking water and the conduit for sewage disposal. Industries drain wastes into them and children dive in for a swim. We demand much of our rivers, and we have taken much from them. Most of the time we have failed to comprehend how intricate and, in some ways, how delicate our rivers are.

In the watershed of the Columbia River, *people* have become the most critical element. Throughout most of the river's drainage, people have built up a society and altered the ecosystem. Now people must improve the ecosystem that remains.

The problem is, we don't know how to re-weave the fabric of a natural system. And the whole cloth of the Columbia Basin has been cut and shaped to suit the growth of this region.

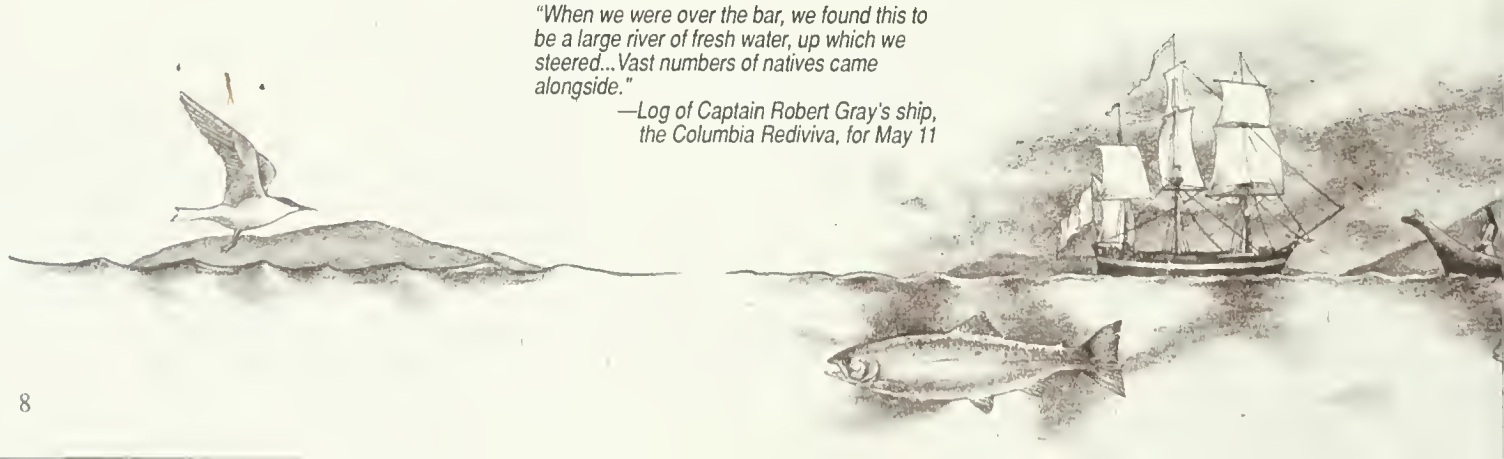
Our Columbia River Basin Fish and Wildlife Program recognizes that more than a third of the region's native habitat has been lost to development. Our goal is to ensure that we salvage what we can of that habitat and protect it.

We have looked carefully at the life cycles of the fish and wildlife we address and have developed a set of actions to improve conditions at every stage of those life cycles. We stress coordination to increase the benefits of individual actions and reduce the likelihood of redundancy. Most importantly, we approach this work with the attitude that it is a learning experience. We can best educate ourselves and improve our basin by proceeding and, at the same time, monitoring our progress. We call on program implementors to think of themselves as weavers of ecosystems.

1792

"When we were over the bar, we found this to be a large river of fresh water, up which we steered...Vast numbers of natives came alongside."

—Log of Captain Robert Gray's ship, the Columbia Rediviva, for May 11



We want implementors of this program to look at whole watersheds, not just individual stream reaches. We want to see habitat cared for in ways that help sustain the broadest range of species. We want the full life cycles of fish and wildlife to be studied and enhanced. We are encouraged by cooperative efforts already under way throughout the basin, where private landowners are working with government entities and volunteers to repair land so fish and wildlife can once again thrive there. These are the sorts of actions we'd like to see replicated.

Within this program, individual efforts are prioritized, coordinated and integrated. Some of the actions reflect the emergency created by the salmon's decline. Others are less urgent and can be implemented over time. All are designed to systematically increase the region's understanding of the fish and wildlife recovery process — what works and what doesn't.

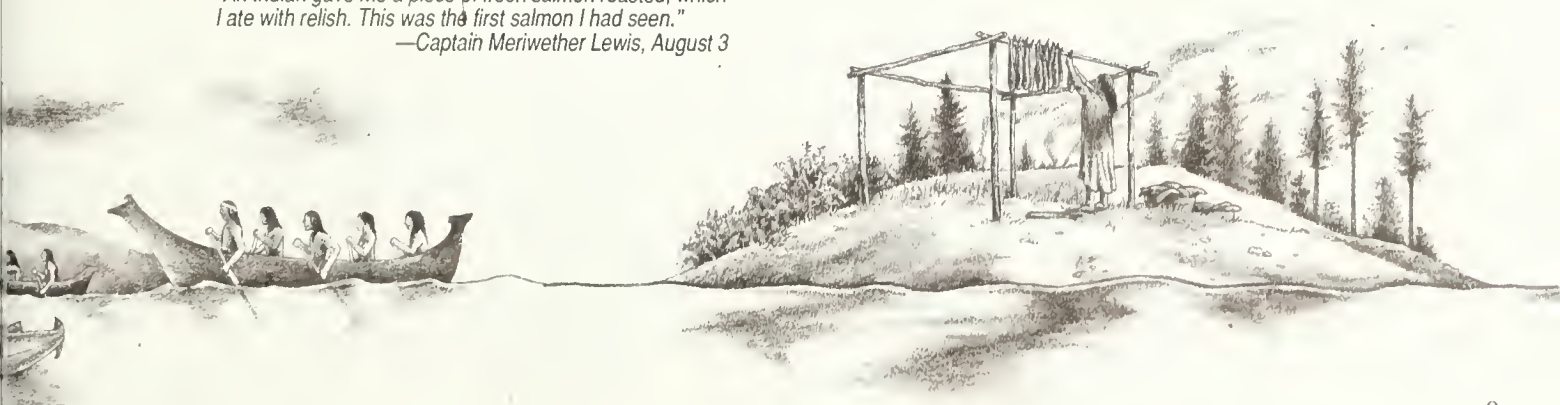
We want habitat cared for in ways that help sustain the broadest range of species.

Program goals

Specific goals of our program include:

- Double salmon runs in the basin, without loss of biological diversity;
- Develop rebuilding targets for all stocks of fish in the basin;
- Recover and preserve the health of fish and wildlife populations that were injured by the hydropower system, where feasible, and mitigate losses of fish and wildlife elsewhere in the Columbia Basin ecosystem;
- Give highest priority to weak, but recoverable, native fish and wildlife populations injured by the hydropower system;
- Rebuild native species of fish and wildlife in native habitats, where feasible, but do this in a way that avoids impacts on existing populations;
- For wildlife, achieve and sustain levels of habitat and species productivity that fully mitigate losses resulting from the construction and operation of both federal and non-federal dams.

1805
"An Indian gave me a piece of fresh salmon roasted, which I ate with relish. This was the first salmon I had seen."
—Captain Meriwether Lewis, August 3



The River
Who NEEDS it?

Hydropower — Two-thirds of the electricity used in the Northwest comes from hydropower dams. In even the driest years, the dams supply enough electricity for 12 cities the size of Seattle.

Industry — Aluminum companies use Columbia River hydropower to produce 43 percent of the U.S. aluminum output. These companies account for 30 percent of the Bonneville Power Administration's revenues.

Navigation — The Columbia is second to only the Mississippi River in shipping. It is the West Coast's top port system in export cargo, which includes 35 percent of all U.S. wheat exports.

Agriculture — The Columbia is the primary source for irrigation water and pumping power on 8 million acres of Northwest farms. This land provides nearly 75 percent of the region's farm revenues — or $5 billion worth.

Fishing — Even with depressed runs, estimates of the value of Columbia River salmon for commercial and sport fishing and related industries are in the hundreds of millions of dollars.

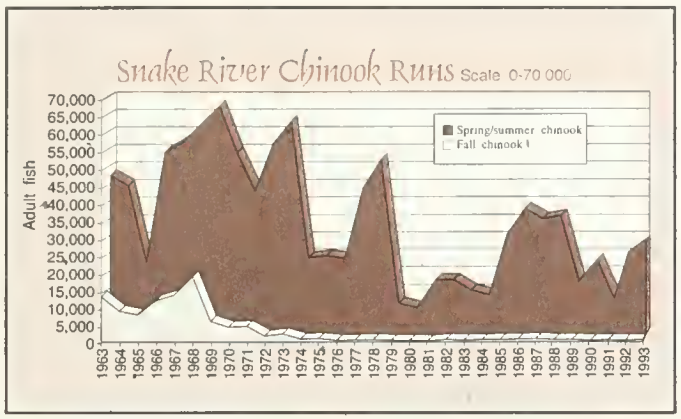
Recreation — The Columbia River and its tributaries attract hundreds of thousands of people each year.

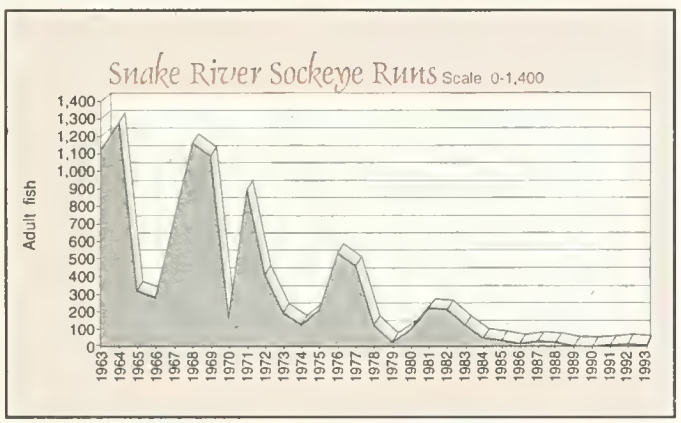
Sources: Columbia River Alliance, Bonneville Power Administration, Northwest Power Planning Council.

1806
"There was great joy with the natives last night, in consequence of the arrival of the salmon."
—Captain Meriwether Lewis, April 19

While this program is made up of individual actions, it will be implemented through a structure and process that will ensure that the region receives the best possible return from its investments. We are committed to the concept of "adaptive management," which means that we treat some actions as experiments designed to garner knowledge as well as effect a change. Through careful monitoring and evaluation, we will judge which of our actions are most effective and which ones fall short of our expectations. Effective measures can then be continued, and ineffective measures modified.

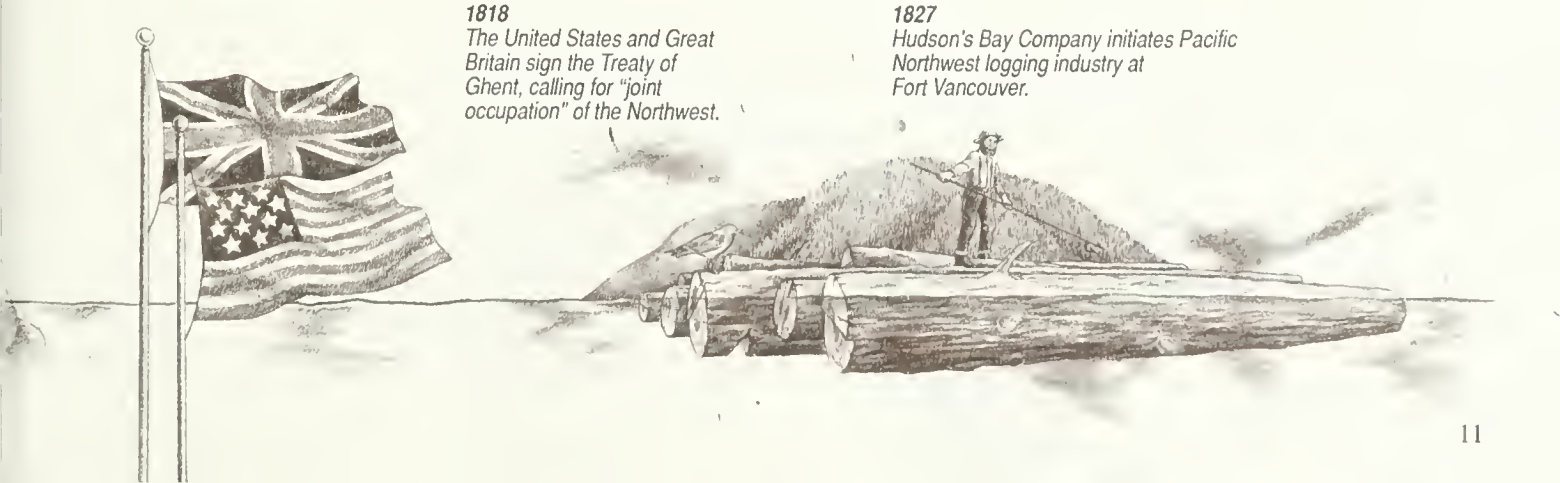
Our program identifies a number of key biological uncertainties and recommends methods to address them. The program is





The Status of Snake River Salmon

In 1991 and 1992, Snake River runs of chinook and sockeye salmon were listed under the federal Endangered Species Act. These charts are based on fish counts at dams. Note that the sockeye run is on a different scale, given its extremely low numbers.



1818
The United States and Great Britain sign the Treaty of Ghent, calling for "joint occupation" of the Northwest.

1827
Hudson's Bay Company initiates Pacific Northwest logging industry at Fort Vancouver.

designed with an overall framework in mind to allow systematic testing of the effectiveness of program measures. This framework is being developed by fishery managers. When completed, the framework will include goals, rebuilding targets and performance standards. The framework also will give the region clear mitigation objectives, a means to measure biological effectiveness and a system for auditing results.

Finally, our program recognizes that the Columbia River Basin does not stop at the international border. Some fish and wildlife migrate back and forth across the U.S. and Canadian border. So we call for discussions to determine whether, and to what extent, U.S. electricity ratepayers and taxpayers could share funding with Canada on projects to improve the survival of border-crossing fish and wildlife.

Distinctions

Columbia River Basin salmon are the subject of at least two major rehabilitation efforts. One is a recovery plan being developed by the National Marine Fisheries Service. You're reading the other one.

The National Marine Fisheries Service recovery plan is being designed by a team of fisheries specialists. It only addresses those salmon runs that have been listed under the federal Endangered Species Act. The Act requires federal agencies to develop and implement a recovery plan that can save listed species from extinction.

The fish and wildlife program you hold was devised by the Northwest Power Planning Council through a multiyear, very broad public involvement process. It features measures to protect and revitalize salmon runs, but it also addresses *all* Columbia Basin fish and wildlife that have been affected by hydroelectric dams in the region. The hope is that future listings of other animals will be unnecessary if the region takes a *basinwide approach* rather than looking at only a few species.

The goal of this program also is broader than that of the Fisheries Service. This program aims to rebuild salmon runs to sustainable and harvestable levels, so they can again take on the important economic and cultural role they have played in the Northwest's past.

The key to both plans, however, is the same: implementation. Unless the region works together to protect our salmon and other animals, we will very likely be witnesses to their continued decline.

1832
Nathaniel Wyeth of Boston establishes Fort William on Wapato (Sauvie) Island at the mouth of the Willamette River as a site to catch and pack salmon.

A Strategy for Salmon

Salmon: The price of prosperity

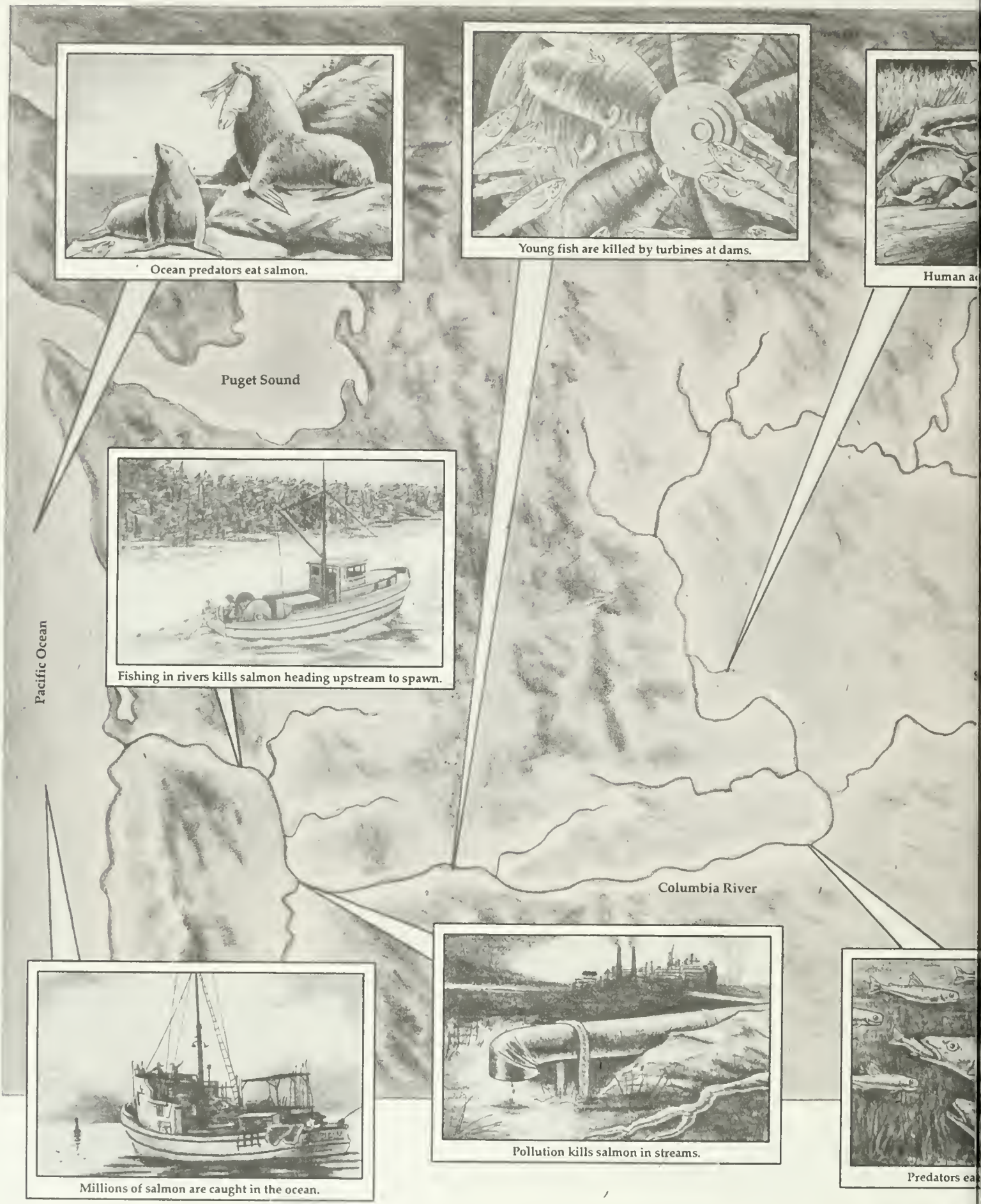
The price for the region's prosperity is being paid by people, businesses and river communities that once thrived on salmon. It is a price realized in lost jobs, business failures and lost community income from business investments and tourism.

It is a price that hits Columbia Basin Indian tribes particularly hard. Salmon are important to the tribes for religious, cultural, economic and subsistence purposes. Some tribes are guaranteed the right to fish for Columbia salmon by treaties with the United States dating to 1855.

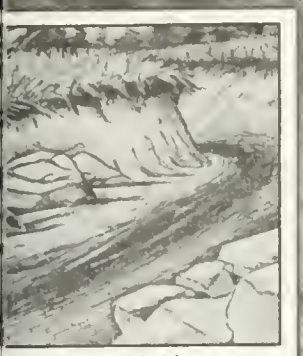
We can rebuild salmon populations in the Columbia Basin if we act quickly, carefully and cooperatively. And we can accomplish this goal without eliminating other uses of the river, or jeopardizing our efficient and economical supply of electricity.

What follows is a comprehensive strategy that calls on everyone in the Northwest to help us double the size of salmon runs in ways that ensure continued returns for many generations. Salmon rebuilding efforts must address every stage of the salmon life cycle if they are to be effective. Otherwise, our region could invest millions of dollars on a few aspects of the problem, while salmon are still killed because of other problems.

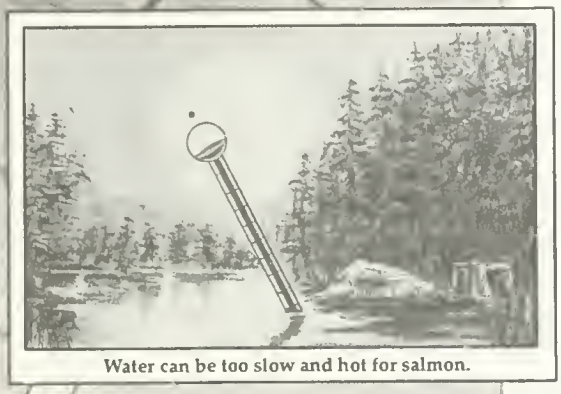
1840s
First farm irrigation systems installed adjacent to missions near Walla Walla, Washington, and Lewiston, Idaho.


Ocean predators eat salmon.
Young fish are killed by turbines at dams.
Human ac
Puget Sound
Fishing in rivers kills salmon heading upstream to spawn.
Pacific Ocean
Columbia River
Millions of salmon are caught in the ocean.
Pollution kills salmon in streams.
Predators ea

The Long Struggle of Columbia River Salmon



damage salmon habitat.



Water can be too slow and hot for salmon.

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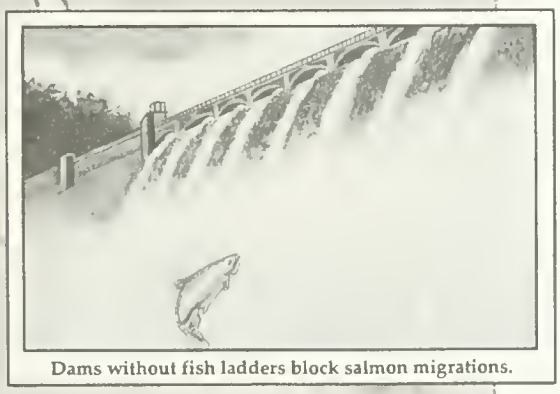
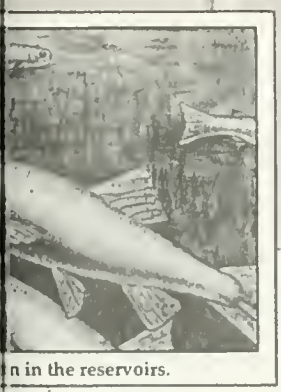


Dams without fish ladders block salmon migrations.



n in the reservoirs.

Note: The pointers used here are graphic devices. These impacts occur throughout the basin.

From the time they are hatched to the time they die, salmon are in motion — and in peril. While still quite young, they drift on a wash of runoff that carries them down from their freshwater birthing streams to the saltwater sea. For some young salmon, this first trip of their lives can be 900 miles long. They must pass as many as nine major hydroelectric dams, where turbines can kill or stun them, leaving them easy prey for waiting predators.

Before the dams were built, the journey to the sea was a quick one, lasting a week or less. With the dams, the salmon are often stalled in reservoirs. The hazard here is a biological one. Their instinct to migrate can be lost.

Only about a quarter of the young salmon survive the first leg in their long migration.

Once in the Pacific Ocean, most of the Columbia's salmon swim north, traveling thousands of miles, feeding on small sea creatures along the way. Larger sea creatures, in turn, feed on them.

In the ocean, Columbia River salmon also are the target of major commercial and sport fishing industries. By the time they turn back toward the mouth of the Columbia, only a fraction of their original number remain.

In the lowest reaches of the Columbia, fishers again await the salmon. Fish that escape capture here are the remnant hope of future runs, but they must first struggle back past the dams.

The final survivors — typically less than 1 percent of the original tiny migrants — seek the stream of their origin, where they will reproduce, then die. But more than a third of the spawning streams in the basin have been blocked off by dams that lack fish ladders. Much of the remaining habitat was degraded by siltation, pollution, excessive water temperature and the loss of spawning gravel and deep holes where salmon rest and feed. The poor condition of these streams will be the first, and last, constraint on the survival of the Columbia River salmon.

Endangered Species Act

In the late 1970s, petitions were filed to protect certain salmon runs under the federal Endangered Species Act. These petitions were deferred pending creation of the Council and our fish and wildlife program.

The Council's 1982 Columbia River Basin Fish and Wildlife Program contained more than 220 actions. Despite delays in implementing some parts of the program, most actions were undertaken in the mid-1980s, and the salmon rebuilding effort got under way.

> In 1993 only eight sockeye salmon returned to spawn in Idaho's Redfish Lake.

Some salmon runs, particularly in central Washington, improved, producing some of the best runs in decades. But other runs continued to decline.

In 1993, for example, only eight sockeye salmon returned to spawn in Idaho's Redfish Lake. These fish swam 900 miles from the Pacific Ocean up the Columbia, Snake and Salmon rivers, past eight huge dams and finally to the lake that was named for sockeye, which turn bright red when they reach spawning age.

In November 1991, the National Marine Fisheries Service declared Snake River sockeye an endangered species. Five months later, after returns of Snake River spring, summer and fall chinook had declined to a total of about 10,000 fish, the Service declared them to be threatened species.

Under the Endangered Species Act, agencies of the federal government — in this case, the National Marine Fisheries Service — must devise recovery plans for listed species.

The Strategy for Salmon is, in part, our response to a request from the Northwest Governors, the region's Congressional delegation and the National Marine Fisheries Service to expand the charge we were given by the Northwest Power Act. Under the Power Act, we must address the hydropower system's effect on fish and wildlife in the Columbia Basin.

1843
Year of the "Great Migration." Some 800 emigrants come down the Columbia to Fort Vancouver and the Oregon Country.

Our new charge was more extensive. We were asked to look at all impacts on salmon and devise a comprehensive, regionally accepted and economically balanced salmon recovery strategy.

We worked closely with the National Marine Fisheries Service in developing this strategy, and the Service used it as the foundation for the draft Snake River salmon recovery plan developed in 1993 under the Endangered Species Act.

The Council is uniquely situated to devise a regional salmon plan. We are a regional planning agency. We represent the states and Governors of Idaho, Montana, Oregon and Washington.

The Northwest Power Act directs us to develop our fish and wildlife program with the assistance of others, particularly state and federal fish and wildlife agencies and Indian tribes. This is what we have done.

> The goal of the salmon strategy is to double Columbia River Basin adult salmon populations without losing biological diversity.

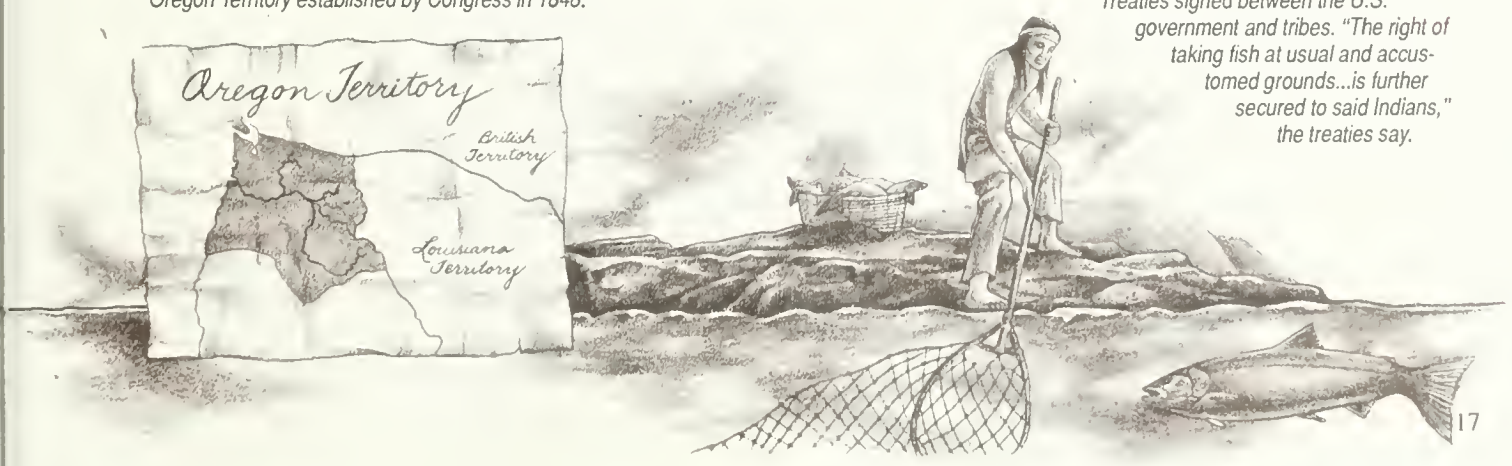
Double the runs

The principal goal of the salmon strategy in this fish and wildlife program is to double Columbia River Basin adult salmon populations without losing the biological diversity that now exists. A balance must be struck between multiplying numbers of fish and preserving the survival traits and other characteristics inherent in salmon that spawn naturally in our waters.

This strategy also establishes numerical targets for rapidly rebuilding salmon runs in the Snake River Basin, where the salmon decline is most dramatic. For Snake River spring chinook, that rebuilding target is 50,000 adult salmon returning to the Snake

1846
Oregon Country border established through treaty with England. Oregon Territory established by Congress in 1848.

1855
Treaties signed between the U.S. government and tribes. "The right of taking fish at usual and accustomed grounds...is further secured to said Indians," the treaties say.



Basin. For Snake River summer chinook, the target is 20,000 adults. For fall chinook, the rebuilding target is 1,000 fish. These are ambitious but achievable targets if we begin to act now.

The salmon life cycle

Rebuilding salmon runs is a complex process because the salmon lead complex lives. They spawn in freshwater, but grow to maturity in the saltwater sea. They are carried hundreds of miles down streams and rivers by the early thaws and mountain runoff. They pass as many as nine major Columbia and Snake river dams on their downstream migration.

As adult fish in the ocean, they travel thousands of miles, pass through numerous jurisdictions and along the shores of two nations. They are the subject of intense fishing both at sea and in the lower Columbia. Finally, those that survive must push back up the rivers to spawn where they were hatched.

Our strategy has measures for every stage of that journey. And we have structured those measures to help coordinate the effort, and ensure monitoring and evaluation. We must be able to shift emphasis or direction as new information becomes available.

Increase salmon survival in the rivers

Our strategy will improve fish survival at the dams on the Snake and Columbia rivers, as well as in tributaries. The plan speeds the migration of juvenile fish to the ocean by accelerating the flow of water in the rivers. It calls for protective screens to divert migrating fish from turbines at the dams and from irrigation and other diversions of water. It calls for improved barging of juvenile fish past the dams. And it seeks to control predators that feed on young salmon.

Some actions in our strategy can begin immediately. Other measures need additional study before they can begin.

Immediate flow measures

Dams changed the Columbia and Snake from fast-flowing rivers to a series of slow-moving reservoirs. Young salmon are on a biological time clock. To reach the ocean safely, they must complete their downstream journey quickly. Before the dams, they did. Our plan calls for many actions to improve the survival of salmon during their migration.

1861
Idaho gold rush begins, increasing ship traffic on the Columbia and Snake rivers.

This is not a new idea. Since our first fish and wildlife program was adopted, the U.S. Bureau of Reclamation and the U.S. Army Corps of Engineers, which operate the federal dams on the Snake and Columbia rivers, have been boosting flows to speed salmon migrations. A specified amount of water is held behind upriver storage dams during winter and then released in the spring.

Our salmon strategy substantially increases the amount of water stored for these annual salmon flows.

Except in the lowest water years, we want to achieve a Snake River speed that is equivalent to a flow of at least 85,000 cubic feet per second during the migration period. This figure should be used for planning purposes only. It is a minimum, not a maximum. To reach this speed, reservoirs should be lowered behind John Day Dam and the four dams on the lower Snake River to the lowest level at which navigation locks and irrigation pumps can still operate. The Corps of Engineers is providing additional water to the Snake from Dworshak Dam, which is located upstream on the North Fork Clearwater River, and Idaho Power Company and the Bureau of Reclamation are providing some water from the upper Snake River.

Flows in the Columbia will be increased, too. Our program calls on river operators to provide up to 3 million additional acre-feet of water to aid juvenile salmon migration in the spring and early summer, and to evaluate spring and summer flows.

Our strategy also addresses the plight of adult fish migrating upstream. Releases of cool water from storage reservoirs should help these fish. We've asked the Idaho Power Company and the Bureau of Reclamation to release additional water from Snake River reservoirs to assist migrating adult salmon. In addition, Idaho Power, which owns and operates Brownlee Dam, makes water available to keep fall chinook redds (nests of eggs) wet.

Intermediate measures

In preparing this strategy, we recognized that actions the region can take immediately are not sufficient to rebuild some weak populations of salmon or meet the Council's targets. So we identified a set of intermediate measures that will be needed, but which require further planning before they can begin. Some of these measures are controversial, and there is disagreement about their cost and effectiveness.

One intermediate measure involves moving water more quickly past the dams. By lowering water levels in the four lower Snake River reservoirs even more than in previous measures, the river channel narrows, causing water to rush more quickly.

Because this degree of drawdown will take the water below the levels where

1880
Mining, logging and livestock production, by now in practice about 30 years, begin to have a noticeable effect on soil and water quality in parts of the Columbia Basin.

navigation locks and even fish passage facilities can operate, the dams and fish passage facilities could require modifications.

We call on the Corps of Engineers, other agencies and Indian tribes to help us evaluate the effectiveness of using this degree of drawdown in combination with other flow measures. This involves preparing plans on drawdown design, operations, biological impacts and mitigation of economic consequences. The Corps is developing these plans, in consultation with the Bonneville Power Administration, the Bureau of Reclamation and our Council. These plans are expected to be completed in 1994.

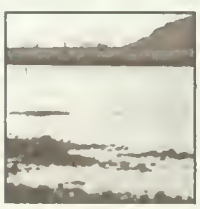
Immediate ACTIONS at the Dams

Flows
Store more water in the winter and release it in the spring and summer to boost flows when juvenile salmon migrate to the ocean.

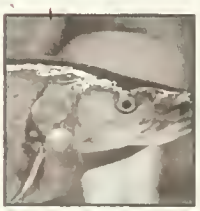
Transportation
Improve barge transportation of juvenile fish past Snake and Columbia river dams.

Screens and Bypass
Screen turbines and improve bypass systems that carry young salmon past dams.

Spill
Move young salmon downstream by spilling them over dams, until adequate turbine screens are in place.



Minimum Operating Pools
Lower reservoirs to the minimum levels at which navigation locks will still operate, to make the current faster for salmon migration.



Control Predators
Reduce the number of salmon predators.

1882–1893
Rail lines connect eastern Washington to West Coast ports, then eastern United States to western products and people.

At our request, the Corps of Engineers carried out a test drawdown of Lower Granite and Little Goose reservoirs in March 1992. That test indicated that Lower Snake River dams could be modified to accommodate the physical and structural impacts of drawdowns. The next step for drawdown testing is to assess the biological effects on salmon. The Corps is working with other agencies to devise a biological test.

Our fish and wildlife program also calls for water management measures that will yield at least an additional million acre-feet of water each year for salmon. Other measures, such as more water storage in reservoirs, could yield additional water.

It is the intent of the Council to have the Snake River drawdown strategy and these other measures implemented unless they are shown to be structurally or economically infeasible, biologically imprudent or inconsistent with the Northwest Power Act. These measures will be in addition to or complement measures already initiated to achieve rebuilding targets.

We will review and re-evaluate fish-barging and flow-augmentation measures upon receipt of the final reservoir drawdown plans. Once we have evaluated all of these measures, we will develop the best strategy to meet the biological goals and objectives of this program.

State water agencies are also working to find ways to ensure that flows will be adequate to protect fish. We call for water availability studies, establishment of minimum streamflow levels, a halt to new water appropriations that could harm salmon and acquisition of existing water rights on a "willing-seller" basis to improve river flows.

Fix dams and water diversions

One of the most effective actions to improve the survival of young salmon is to guide them away from turbines and water diversions. The reason is simple: fish can die or be stunned if they are drawn through the turbines at dams, and they can become lost and die if they swim down water diversion channels. Screens and bypass channels are the answer to this problem.

Without screens, *each* Columbia and Snake river dam can kill between 10 percent and 30 percent of the young salmon that pass through the turbines.

Twelve years ago, in our first fish and wildlife program, we called for screens and bypass channels at all Columbia and Snake river dams that didn't have them already.

1902
Reclamation Act authorizes federal aid to settle land and develop farms. By 1910, irrigated acreage in the basin increased fourfold.

1908
"The salmon fisheries of the Columbia River are now but a fraction of what they were 25 years ago."
—President Theodore Roosevelt, arguing for Congressional fishing regulations on the Columbia

Initially, there was resistance from the federal Office of Management and Budget. Screens for the big dams are big themselves, and expensive. But the region and Congress support screening the dams, and the work should be completed by March 1998.

Next, we focus on installing screens at water diversions. Because there are so many unscreened diversions — literally thousands —we ask fishery managers to accelerate screening projects in priority areas where there are depleted salmon runs. This will help ensure timely construction and installation where the need is greatest.

Intermediate ACTIONS at the Dams

Drawdown
Increase the speed of the river current by lowering the reservoirs behind the four lower Snake River dams and John Day Dam.

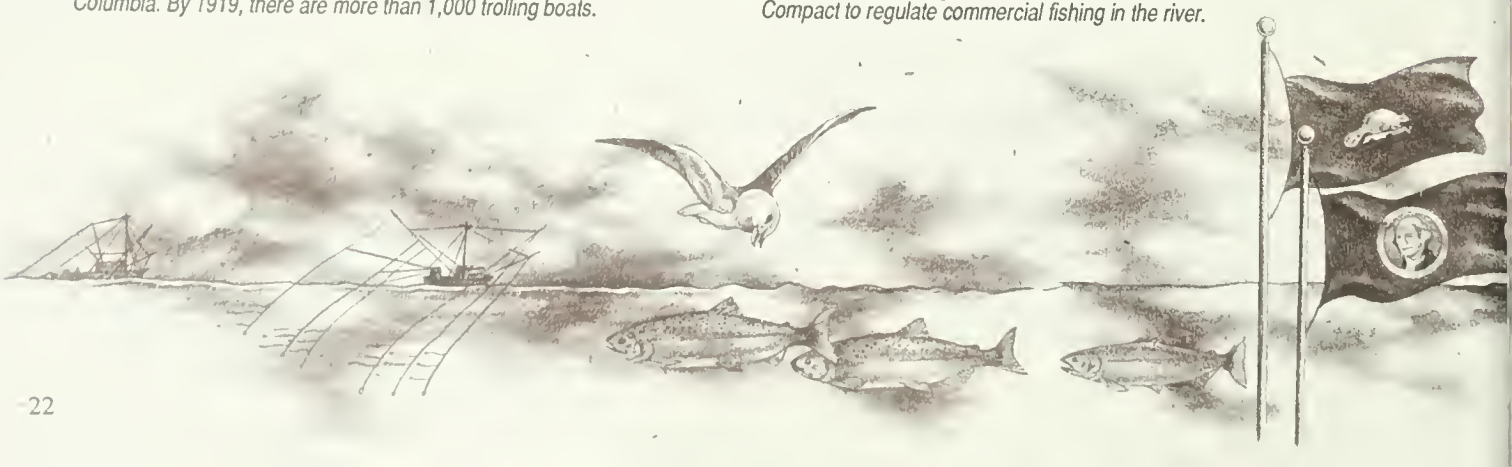
Storage
Increase water storage in the upper Snake River Basin to help boost flows for migrating salmon.

Seasonal Power Exchanges
Increase river flows by selling hydroelectricity to the Southwest in summer, when power use is highest there, and buying it back in winter.

Water Conservation
Conserve water in the Columbia and Snake basins, thus leaving more water in the rivers for salmon.

1912
Ocean commercial trolling for salmon begins off the mouth of the Columbia. By 1919, there are more than 1,000 trolling boats.

1915
Washington and Oregon form Columbia River Fish Compact to regulate commercial fishing in the river.



Improve smolt barging

Some salmon are collected at McNary, Little Goose and Lower Granite dams, then transported in special barges past the downriver dams. They are released below Bonneville Dam to continue their journey to the ocean.

The current barge transportation system began in 1981. At the time, it was considered an interim measure to move smolts past the dams until diversion screens were in place.

Over the years, the Corps of Engineers and regional fishery managers have analyzed the benefits of transportation. The conclusion: benefits vary widely among salmon species. Steelhead and fall chinook appear to benefit the most. Benefits for spring and summer chinook and sockeye are less clear. Generally, scientists agree that transporting salmon around the dams can increase survival under some conditions.

In the immediate years ahead, barging is one of the few tools the region has to improve salmon survival, particularly in low-water conditions. Barge transportation of salmon should be improved immediately to boost salmon survival in the near term.

In our fish and wildlife program, we call on the Corps of Engineers to expedite improvements in transportation. Cooler water and less crowded conditions in the barges, for example, may help reduce stress and improve survival. When the fish are released from barges below Bonneville Dam, survival may increase if the fish are dispersed more widely in the lower river. This could help them avoid predators and adapt to river conditions.

Control salmon predators

Conditions in the modern Columbia and Snake rivers, because of the dams, are ideal for salmon predators, particularly squawfish. They thrive in the warm, slow-moving water of the reservoirs.

Other factors also favor salmon predators. For example, hatchery smolts sometimes are weakened by disease or don't know how to avoid predators. Smolts are easy prey below dams because they are stunned after passing through the turbines.

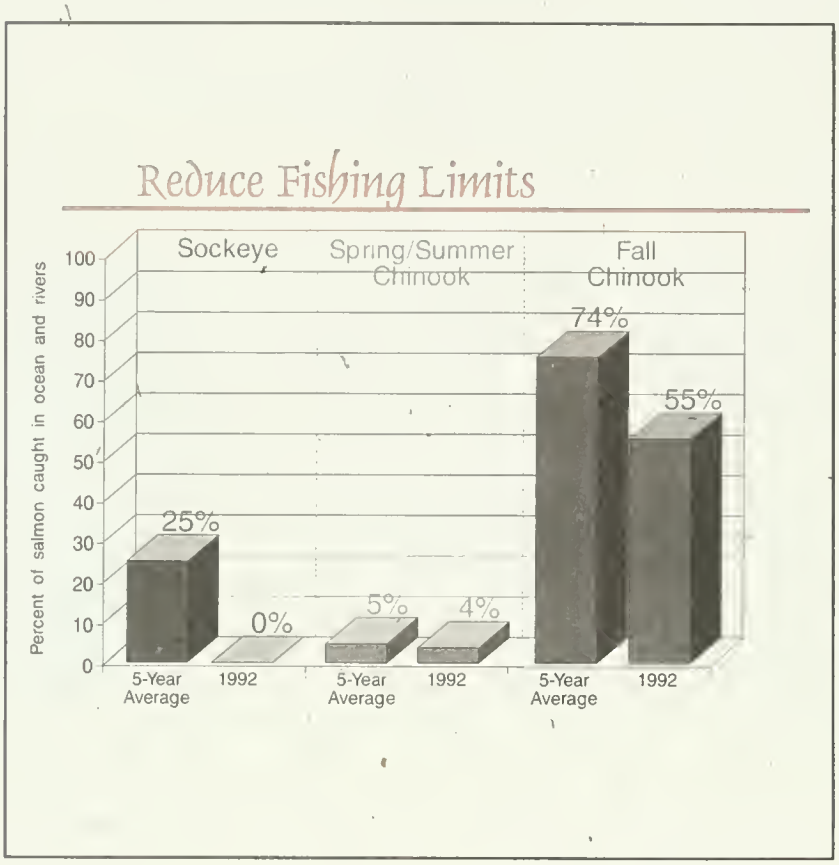
One solution to this problem is to reduce the number of predators. Our strategy calls for reducing the squawfish population by 20 percent. Experts believe this could lead to a 25-percent reduction in predation.

1916–1920
Columbia River salmon canneries reach their peak production: 550,000 cases per year, 48 pounds per case.

We also are concerned about the survival of adult salmon. Many are killed by seals and sea lions in the lower Columbia River. But seals and sea lions are protected by federal law. We can only urge the National Marine Fisheries Service and Congress to continue evaluating the impact these creatures have on salmon.

Reduce and refine salmon fishing

Fishing for salmon always has been a central part of Northwest life. Income from both sport and commercial salmon fishing supports thousands of people regionwide — particularly in fishing towns near the mouth of the Columbia River.

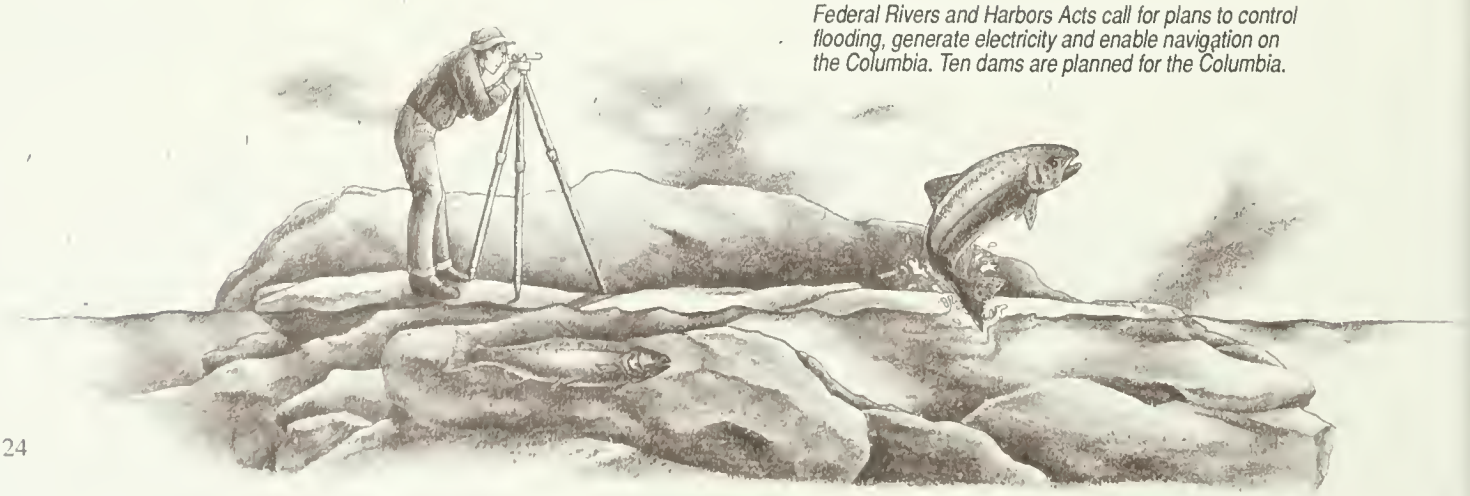


The Status of Snake River Salmon

Snake River sockeye are caught mostly in the Columbia River, while Snake River fall chinook harvests are greatest at sea. We call for important harvest reductions in both fisheries.

Harvest rates on Snake River spring and summer chinook already are low, and we ask that they be kept at or below those low levels.

1925 and 1927
Federal Rivers and Harbors Acts call for plans to control flooding, generate electricity and enable navigation on the Columbia. Ten dams are planned for the Columbia.



Indians have treaty rights to catch salmon for cultural and religious ceremonies, for sale and to feed their families.

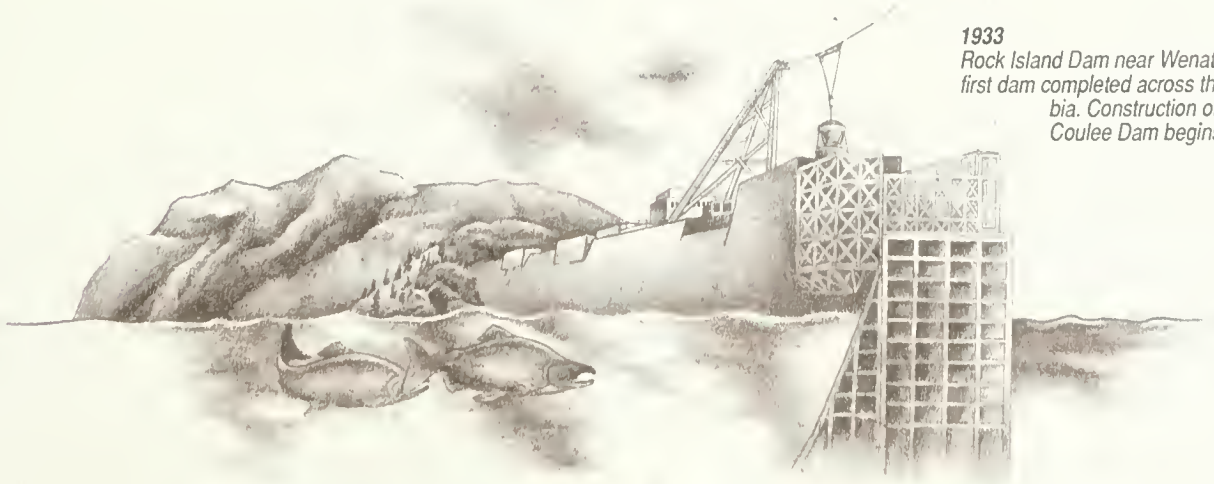
Beginning about the mid-1800s, commercial salmon harvesters steadily increased their catch. Fish wheels, nets and traps took large numbers of salmon out of the Columbia to supply the booming canning industry. Harvesters took so many salmon that by the 1870s there already was concern for the future of the runs, and the first salmon hatcheries were built.

There has been no commercial fishing for Columbia River summer chinook salmon in Idaho since 1964.

Since the 1960s, state, federal and international fishery managers have been steadily cutting harvest rates to protect salmon runs. For example, there has been no commercial fishing for Columbia River summer chinook salmon since 1964. The last fishing season for any Snake River chinook salmon in Idaho was in 1975, although limited fishing continues for salmon returning to a hatchery on Idaho's Rapid River, a Salmon River tributary. And the United States and Canada signed a treaty in 1985 that set limits on harvests of salmon originating in both nations.

Because our Council lacks the authority to regulate harvest seasons, we ask fishery managers to continue their moratorium on commercial fishing for summer chinook, and to halt commercial harvest of sockeye below the confluence of the Snake and Columbia rivers to protect endangered Snake River sockeye. The governors of Washington and Oregon have directed their state fishery agencies to follow our harvest restrictions.

We also call for immediate reduction of overall harvest rates on Snake River fall chinook — another threatened species — to no more than 55 percent of the projected run. In recent years, the harvest rate has been as high as 77 percent. In 1993, harvest managers reported that they met our new targets. Non-treaty river harvest of spring chinook should be limited to about 4 percent of the upriver run, just under the 1987-1991 average catches.



1933
Rock Island Dam near Wenatchee is the first dam completed across the Columbia. Construction of Grand Coulee Dam begins.

In addition, we urge the Pacific Salmon Commission, which represents the United States and Canada under the Pacific Salmon Treaty, to further reduce ocean harvests of salmon originating in the Columbia River Basin.

Traditional commercial fishing techniques were designed to catch large numbers of fish, but because salmon from different runs swim together at sea, both abundant and depleted runs are harvested. In light of declining runs, we need new ways of fishing to focus on stronger runs and avoid weaker ones.

For example, fishers could take advantage of the timing and location of abundant runs. This selective fisheries practice would allow naturally spawning salmon to pass. Abundant runs could be targeted with modern forms of fish wheels or traps. Fish that spawn in rivers could be released, and hatchery fish could be kept.

> The goal is to cut harvests and enable more adult fish to reproduce.

The Council has called on commercial fishers, Bonneville, and the states of Oregon and Washington to develop a voluntary program to reduce the number of commercial fishing licenses in the region by purchasing the licenses back from the fishers. Again, the goal is to cut harvests and enable more adult fish to reproduce.

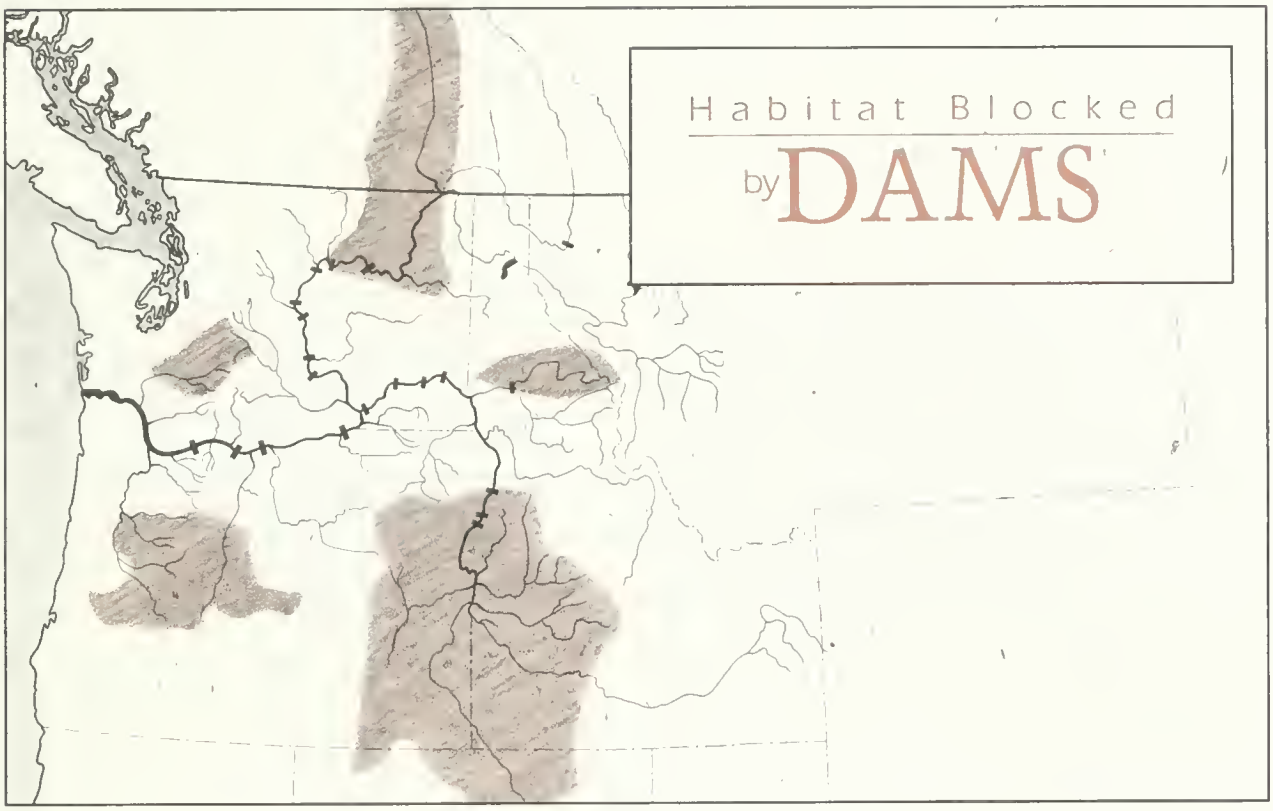
Our salmon plan also calls for a review of sport fishing regulations and adoption of more rigorous catch-and-release rules to protect depleted runs. We seek an accounting of incidental harvest of salmon in other fisheries, and increased law enforcement and public education to deter illegal fishing.

1937
Lowest Columbia River flow on record.
Bonneville Power Administration created.

1937
"The transmission of electricity is making such scientific strides today that we can well visualize a date...when every community in this great area will be wholly electrified."
—President Franklin Roosevelt dedicating Bonneville Dam.

To further protect Columbia Basin salmon, we endorse the United Nations resolution to end the high seas drift-net fishery.

Finally, fishery regulators need a better understanding of how many salmon are being caught and where they are being caught. This would help them set harvest seasons. We ask the National Marine Fisheries Service to report each year on all ocean and river harvests, and the number of fish that escape capture and head upriver to reproduce.



1938
Bonneville Dam begins operation.

Improve salmon habitat

Salmon habitat includes the streams where spawners lay their eggs, where eggs hatch and where young fish spend the first year or two of their lives. It includes the rivers, the tributaries, the Columbia estuary and the Pacific Ocean.

The quality of habitat determines how many fish survive. Ideally, good spawning habitat has clean, cool water. Streambanks are well-shaded by vegetation. Spawning gravel is abundant and clean. Rocks and woody debris in the water create pools for resting and feeding.

HABITAT

Before and After

Salmon need cool, clean water in the shallow streams where they reproduce. Where shorelines have been stripped of grasses, shrubs and trees that shade the water, the stream heats up. Erosion is more likely, and erosion can silt up the gravel in the stream, making it less suitable for the salmon to build nests and lay eggs.

Planting the shorelines with quick-growing grasses and shrubs, and keeping livestock away from the plants restores the stream to a healthier environment for the salmon.

1941
Grand Coulee Dam begins operation, closing off entire upper Columbia River Basin to salmon migration.

As human populations increased, so did impacts on salmon habitat. For example, the construction of Grand Coulee and Hells Canyon dams, which have no fish ladders, eliminated about one-third of the available salmon habitat in the basin. Other activities degraded the quality of remaining habitat.

Our highest priority for salmon habitat is to maintain its quantity and productivity. We are especially concerned about preserving or restoring streams where salmon and steelhead can spawn naturally.

One objective of our strategy is to ensure that activities to improve salmon production are coordinated for each watershed. This is not just a planning process. It should be how salmon enhancement is carried out, with all parties' interests — especially the salmon's — considered and integrated into an overall approach.

Land and water managers need to focus their attention on protecting streamside areas.

Because about 40 percent of the remaining salmon and steelhead habitat in the Columbia Basin is bordered by private land, it is essential that public and private landowners cooperate in comprehensive efforts to manage salmon habitat.

We are encouraged by cooperative habitat improvements being undertaken in partnerships between private individuals and governments around the basin. These projects not only improve conditions for salmon, but many of them improve agricultural practices and provide educational opportunities, too. Controlling erosion, for example, can make farmland more productive and also improve conditions for salmon by reducing the amount of silt that flows into rivers. We also call on federal and state land and water managers to improve salmon habitat by revising timber, mining and livestock management practices. Land and water managers need to focus their attention on protecting streamside areas.

1948
A 20–day flood on the Columbia destroys the community of Vanport, Oregon, and kills 32 people.

Improve hatchery practices

The ancient Columbia Basin had no fish hatcheries. Salmon reproduced in the shallow, graveled areas of rivers and streams.

As overfishing, dams and other developments took their toll, fish hatcheries were built to compensate for the loss of salmon. Nearly everyone agreed with this approach at the time.

The remarkable homing instinct of salmon worked well with hatchery production. Salmon return to the waters of their birth — in this case, to the hatcheries where they were released as juveniles.

But there have been problems. Some fish hatcheries failed because there was a critical lack of knowledge about fish biology, disease and genetics.

Ironically, as understanding increased and hatcheries became more successful, problems occurred elsewhere. Hatchery fish mix in the ocean with salmon spawned in rivers, and both are caught by fishers. In this mixed-stock fishery, fish that spawn naturally can be overharvested because fishing levels have traditionally been set based on abundant hatchery runs.

In the rivers, too, hatchery fish are a problem because they compete for food and space with naturally spawning salmon from those rivers. There needs to be a better understanding of how many juvenile fish the Columbia Basin can support. This "carrying capacity" has an impact on the survival of all salmon in the river basin. Our strategy calls for research on this issue.

It is a vexing puzzle: the number of fish spawning in rivers is declining, and hatchery fish could help; yet interbreeding could further imperil the naturally spawning species.

What to do?

State and federal fishery managers are developing uniform hatchery practices that enable hatchery fish to survive in the natural environment without harming the fish that spawn there.

When hatchery fish are released into streams to rebuild runs that are facing extinction — a practice called "supplementation" — caution must be taken to measure and minimize genetic and environmental impacts.

We call for experiments to test supplementation as a means of conserving and rebuilding naturally reproducing salmon populations. Both existing and new supplementation projects must be evaluated in terms of their cumulative effects on salmon runs.

Finally, we need additional research into fish survival requirements so that we can tailor our actions to improve conditions for all salmon. In particular, we need a clearer understanding of how many salmon are needed to sustain a given run over many future generations, and what protections these fish need in their environment.

1949–1957
Ten new dams planned or completed in Columbia River Basin.

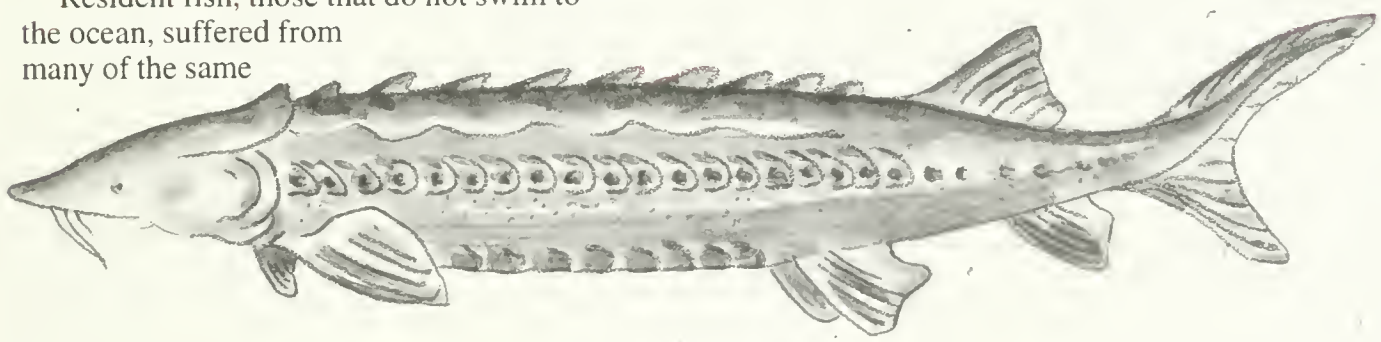
1956
On April 20, Columbia Basin Indians conduct the last of the "First Salmon" rites at Celilo Village before it is flooded by the reservoir behind The Dalles Dam.

A Strategy for Resident Fish and Wildlife

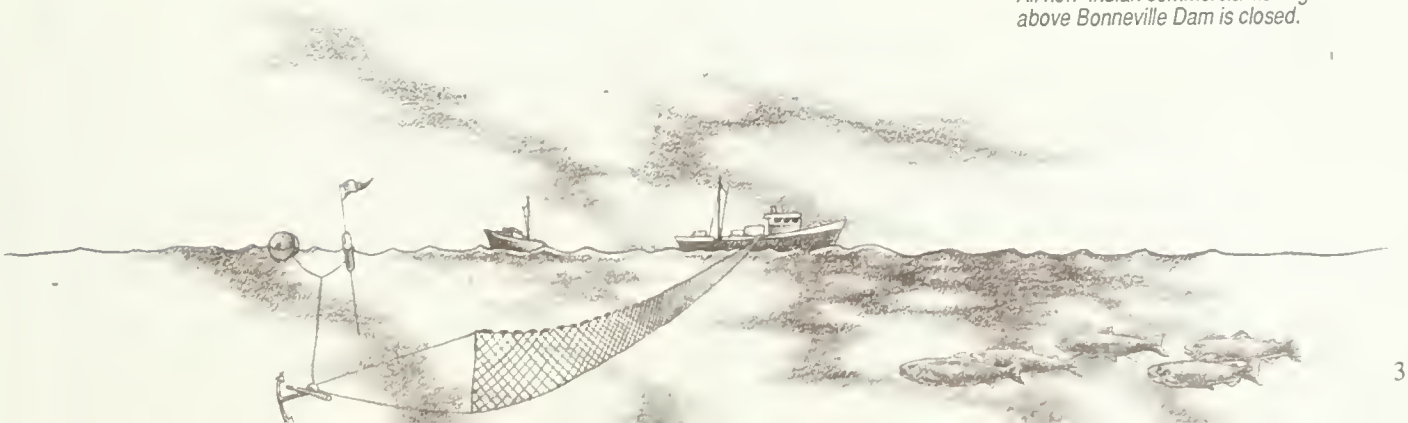
Salmon may be the Columbia River Basin's most prominent fish, esteemed for economic, cultural and even religious purposes, but other native fish and wildlife are critical, too.

Resident fish

Resident fish, those that do not swim to the ocean, suffered from many of the same impacts as salmon. Dams blocked their migrations, changed water temperatures, inundated habitat with reservoirs, fragmented habitat into smaller pieces and caused river flows to fluctuate unnaturally. Because of lower flows, sediment built up in spawning beds.



1958
All non–Indian commercial fishing above Bonneville Dam is closed.



Chemical pollutants also were collected in sediment, creating potentially harmful concentrations in reservoirs and other resident fish environments.

Our goal for freshwater fish is to recover and preserve the health of fish populations that were injured by the hydropower system. When we can, we want to make these improvements where the harm occurred. In places where that is not feasible, we will work in habitats elsewhere in the Columbia Basin ecosystem.

> We want to learn more about the extent of freshwater fish losses.

We need to accelerate our efforts to improve the survival of resident fish. As a region, we have focused more attention on salmon in recent years than on resident fish. This is reflected in Bonneville financing of our fish and wildlife program. Funding for resident fish and wildlife mitigation proceeded at low levels in the past, but we expect these activities will get a higher percentage of Bonneville's fish and wildlife program budget in the future. The Council believes that a level of approximately 15 percent of Bonneville's fish and wildlife project funding is an appropriate budget planning target to spend on resident fish, with another 15 percent spent on wildlife.

While we are concerned about all weak stocks of fish and wildlife in the basin, we believe highest priority for ratepayer-financed mitigation should go to weak, but recoverable, native fish and wildlife populations injured by the hydropower system.

We are also concerned that resident fish production be carried out with the same attention to protecting genetic diversity and minimizing ecological impacts as is paid to salmon production efforts. The program includes creation of a model watershed for resident fish in Montana and another in Idaho above the Hells Canyon complex. These are similar to model watershed efforts for salmon.

We continue to support increasing resident fish populations where salmon runs cannot be rebuilt. Such substitutions have been a part

1963
First nuclear power plant at the Hanford Nuclear Reservation in Washington, ending the "all–hydropower era" in the Northwest.

1963
Columbia River Treaty between the United States and Canada signed to coordinate water storage in the upper Columbia Basin and maximize power production in the United States.

of our program since the early 1980s. In areas where dams wiped out salmon and steelhead populations, Bonneville finances construction of new hatcheries, introduction of resident fish and habitat improvements, in consultation with state agencies and Indian tribes.

We want to learn more about the extent of freshwater fish losses. We call on fishery managers in the four Northwest states to report to us by the end of 1995 on the impact of hydroelectric dams on freshwater fish populations. We expect these reports to address both losses and gains attributable to hydropower. We are particularly concerned about bull trout and sturgeon populations, which have been petitioned for protection under the federal Endangered Species Act. We call for studies to address these specific populations and recommend recovery measures. We also call for a study of kokanee in northern Idaho's Lake Pend Oreille to determine the cause of their decline.

> Dam-related impacts altered land and streamside areas where wild birds and animals live.

Our program includes actions to protect fish at specific dams. For example, to increase protection of fish spawning and rearing areas, we call on the Bureau of Reclamation to regulate water releases at Hungry Horse Dam on Montana's South Fork Flathead River, and the Corps of Engineers to do the same at Libby Dam on the Kootenai River. Drawdowns of Hungry Horse Reservoir have been limited to 85 feet and at Libby to between 90 and 110 feet, while new operating rules for the dams are developed. We call for a study to determine whether adding three new generators at Libby Dam would allow its reservoir to be held at consistently higher levels than currently are possible and afford greater flexibility in dam operations. This could allow Lake Koocanusa to refill earlier in the summer than currently is possible and also benefit fish in the river downstream of the dam.

1967
Hells Canyon Dam begins operation, blocking salmon from the upper Snake River.

1973
Congress passes the Endangered Species Act.

Wildlife

Hydroelectric dams in the Columbia River Basin impact wildlife as well as fish. Some flood plain and riparian habitats that are important to wildlife were inundated when reservoirs behind the dams filled with water. In some reservoirs, fluctuating water levels caused by dam operations scour the shoreline of vegetation, resulting in the loss of wildlife habitat and exposing wildlife to increased predation.

A number of other dam-related impacts altered land and streamside areas where wild birds and animals live. These include road construction, draining and filling of wetlands and altering streambeds.

> Protecting and managing habitat to benefit specific animal populations also benefits other animals that use that land.

Development of the hydropower system did have some benefits for wildlife. For example, some reservoirs provide important resting, feeding and wintering habitat for waterfowl. Our fish and wildlife program addresses the net adverse effects of the hydropower system on wildlife. Electricity ratepayers will finance wildlife mitigation measures to the extent that losses were caused by construction and operation of hydroelectric facilities. Mitigation costs attributable to other purposes of the dams — flood control, navigation and irrigation, for example — would be paid by those responsible.

Through our program, we hope to achieve and sustain levels of habitat and species productivity that fully mitigate wildlife losses resulting from the construction and operation of both federal and non-federal dams.

During the past several years, ratepayer-financed wildlife recovery efforts were accomplished on a project-by-project basis. We approved projects that included the acquisition of wetland habitat along the Pend Oreille River in northeastern Washington and along the Columbia near Portland and Hermiston, Oregon; big game habitat in Idaho and Washington; and habitat for pygmy rabbits and sharp-tailed grouse in eastern Washington. Protecting and managing

1974
U.S. District Court Judge George Boldt rules that Indian tribes with treaty rights to fish can take half the harvestable salmon.

1975
The last Snake River chinook fishing season is conducted.

Wildlife Projects in the Columbia River Basin

Dams in the Columbia River Basin affected birds and other animals, as well as fish. Our program includes measures to mitigate these losses. We want estimates of fish and wildlife losses that are attributable to the hydropower system, including habitat losses. We will then call for replacement of this habitat and, where necessary, improvment of it for use by birds and animals.

In Idaho, Oregon and Washington, mitigation has involved individual projects approved by the Council. Montana has a trust fund, established in 1989 and financed by Bonneville, to pay for wildlife mitigation projects developed by the state.

Here is a look at projects approved by the Council so far to aid wildlife:

Idaho

South Fork Snake River: Protect and enhance 64 miles of the Snake River in eastern Idaho for bald eagles. Mitigation for Palisades Dam.

Camas Prairie: 6,100 acres near Anderson Ranch Reservoir in southern Idaho, including wetlands and uplands for waterfowl. Mitigation for Anderson Ranch Dam.

Pack River: 3,100 acres of wetlands along the northern shore of Lake Pend Oreille in northern Idaho for waterfowl. Mitigation for Albeni Falls Dam.

Craig Mountain: 60,000 acres near the confluence of the Salmon and Snake rivers on Craig Mountain for a variety of wildlife. Mitigation for Dworshak Dam.

Washington

Pend Oreille wetlands: 440 acres along the Washington shore of the Pend Oreille River for waterfowl, bald eagles, deer, muskrat and small birds. Mitigation for Albeni Falls Dam.

Blue Creek Winter Range: 5,400 acres on the Spokane Indian Reservation for big game and upland birds. Mitigation for Grand Coulee Dam.

Peregrine falcon project: Involves releasing three to five falcons per year in the Grand Coulee Dam National Recreation Area between 1993 and 1998. Mitigation for Grand Coulee Dam.

Pygmy rabbit/sharp-tailed grouse: 18,000 acres near the Columbia River in eastern Washington to benefit sharp-tailed grouse and pygmy rabbits. Mitigation for Grand Coulee Dam.

Vancouver Lake lowlands: 814 acres north of Vancouver Lake, along the Columbia River in southwest Washington, for waterfowl, shorebirds, wintering wildlife and migratory wildlife. Mitigation for Bonneville Dam.

Yakima Valley wetlands: 4,870 acres on the Yakama Indian Reservation to benefit waterfowl. Mitigation for four dams on the lower Yakima River.

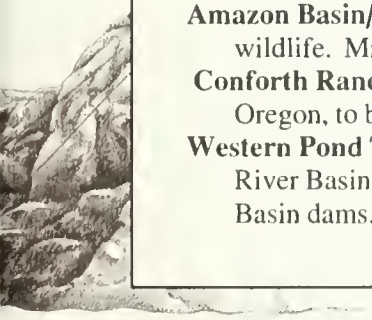
Oregon

Burlington Bottoms: 428 acres along the Willamette River north of Portland to benefit wintering waterfowl and Columbian white-tailed deer. Mitigation for Willamette River Basin dams.

Amazon Basin/Willow Creek: 331 acres of wetlands in Eugene, Oregon, to benefit a variety of wildlife. Mitigation for Willamette River Basin dams.

Conforth Ranch: 2,700 acres along the south shore of the Columbia River near Hermiston, Oregon, to benefit waterfowl and other wildlife. Mitigation for McNary Dam.

Western Pond Turtle: This project involves research on western pond turtles in the Willamette River Basin and, eventually, development of a mitigation plan. Mitigation for Willamette River Basin dams.



habitat to benefit specific animal populations also benefits other animals that use that land.

In the future, we believe wildlife mitigation should be accomplished through agreements between Bonneville and each state. Bonneville already has a long-term agreement with Montana covering some of the wildlife losses in that state, a long-term agreement with Idaho covering a portion of that state's losses, and a short-term agreement with Washington.

To ensure that mitigation efforts proceed quickly, the program called on Bonneville and state wildlife managers to negotiate interim, five-year agreements with Idaho, Oregon and appropriate Indian tribes by February 15, 1994. We call on the same parties to negotiate longer-term agreements by late 1997. In the absence of such agreements, we will select and approve individual projects for Bonneville funding in a given fiscal year. We plan to review all long-term agreements in an open, public process before they go into effect, to ensure they meet the requirements of the Northwest Power Act and are consistent with our program.

We recognize that some wildlife recovery already has occurred, and we want to give it proper credit. We will determine, in consultation with state wildlife managers, Indian tribes and federal river management agencies, the amount of credit to be given for this existing mitigation. We hope to complete this during 1994. The Council then will determine how much wildlife repair work must still be accomplished and amend the fish and wildlife program accordingly.

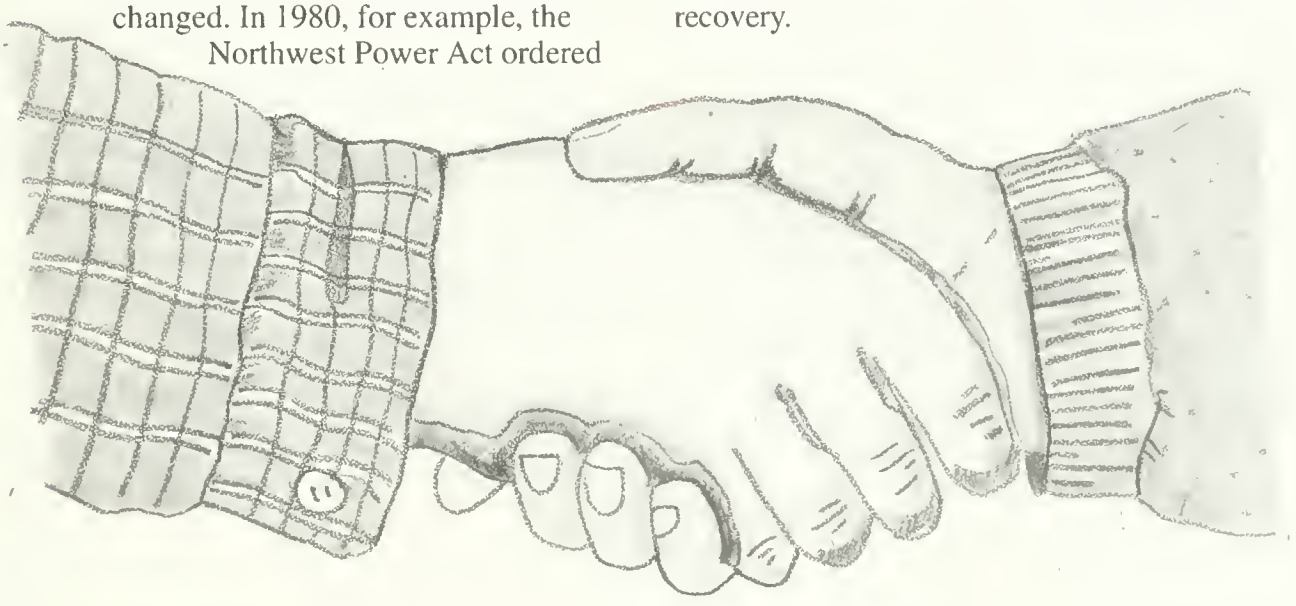
1976
Regional fishery councils created around the nation to oversee fisheries for the area between three miles and 200 miles off the U.S. coasts.

A Call for Cooperation

For more than 50 years, Northwesterners have enjoyed the benefits of the Columbia River system — electricity, irrigated farms, river navigation, flood control, recreational opportunities and more — at a price that doesn't account for the loss of salmon and other creatures that relied on the river for their survival.

But regional attitudes and laws have changed. In 1980, for example, the Northwest Power Act ordered that fish and wildlife of the Columbia River Basin be protected and enhanced because they were damaged by the dams. The cost of rebuilding these fish and wildlife populations is part of the cost of electricity from these dams.

The Act further requires that we treat the entire Columbia River Basin as a single system when we design our program of recovery.



1979
Petitions filed to list some runs of Columbia River salmon under the federal Endangered Species Act. Petitions are withdrawn pending passage of the Northwest Power Act.

1980
Last salmon cannery on the Columbia River closes.

To rebuild fish and wildlife populations, we must consider their well-being whenever our actions intersect with theirs. We must change the way we operate our dams, irrigate our farms, ship our commodities and fish in our waters.

This fish and wildlife program was crafted with all of these elements in mind. It is designed to help guide the regional transition to a more conscientious future, one in which fish and wildlife can thrive without hobbling our economy, and the economy can flourish without killing off the fish or wildlife.

Who pays?

We have no doubt that the Northwest can make this transition, but it will not come cheaply, quickly or without complications. The first steps taken over the past decade have already cost hundreds of millions of dollars. Much of that came from electricity ratepayers.

In 1991, Bonneville Power Administration costs to implement the Council's fish and wildlife program totaled approximately $160 million. These costs include program projects, reimbursements to other federal agencies and lost power revenues from changes in the operation of the hydroelectric system.

The cost of the new ratepayer-funded actions in this revised program will vary depending on water conditions, but they are expected to average about $100 million each year. This figure includes lost power revenues from increasing flows for fish and new research and other new measures in the program. This amount translated into an increase of about 4 percent in Bonneville's 1993 wholesale power rates. The increase at the retail level varied by utility, but on average, the retail increase was about 2 percent.

Bonneville also is repaying past investments for fish ladders that were installed when the dams were built, for salmon barging facilities, and for protective screens and bypass systems at the dams.

But this program recognizes that the dams were not the only cause of the fish and wildlife decline. So, funding to address damages not caused by the dams must also be provided by regional, national and local sources.

We ask the states to absorb some costs, such as the expense of administering necessary changes in salmon management. In addition, the Endangered Species Act is federal legislation, and regional actions to comply with the Act address national as well as regional concerns. Federal agencies must assume an appropriate share of responsibility for paying the cost of recovering listed species.

1980
Congress passes the Northwest Power Act, which allows Idaho, Montana, Oregon and Washington to form the Northwest Power Planning Council.

1982
Northwest Power Planning Council approves first Columbia River Basin Fish and Wildlife Program.

Congress appropriated more than $100 million for 1993 Columbia Basin salmon rebuilding activities, and a similar amount for 1994. These appropriations will enable the Bureau of Reclamation, National Marine Fisheries Service, U.S. Forest Service, Soil Conservation Service and Bureau of Land Management to participate in the salmon rebuilding effort. About half of the money will go to the Corps of Engineers for installation of additional protective screens and bypass systems at federal dams. That amount will be repaid by Bonneville over the life of the hydropower projects.

Who does the work?

We've included a wide range of activities in this fish and wildlife program involving many interests — government agencies, the tribes, farmers, ranchers, fishers, industries and others throughout the Columbia Basin.

Because the Bonneville Power Administration provides the majority of program funding, we ask that agency to work with other implementors to coordinate and manage these efforts.

Success or failure will be evaluated by an independent team of scientists. We at the Council will monitor program implementation continuously.

We intend to contract immediately with a management consulting firm to review the overall structure of the program and help us ensure that it is effectively implemented. This is not a static program. We intend to refine and adapt it as needed and as new information becomes available.

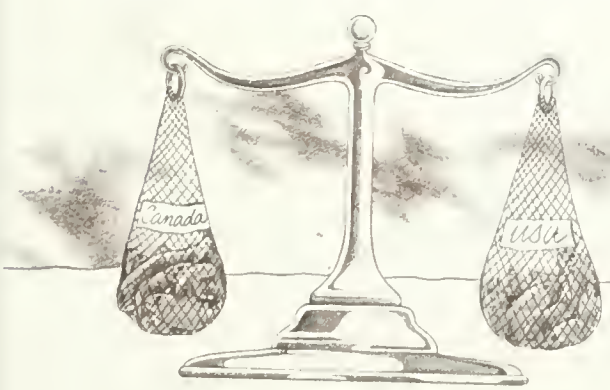
This is called "adaptive management." It begins with the recognition that we may not know everything we need to know to always do the best possible thing. But we also don't have the luxury of waiting until we know everything.

We have to take action, trusting our professional judgment as much as our analysis. Then we must carefully study the effects of our actions. If we're wrong, we change course — we adapt. If our actions provide benefits, we continue them.

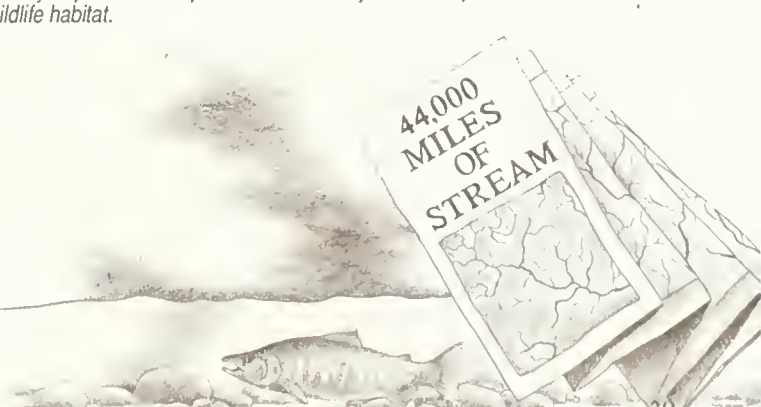
We are particularly concerned that new ideas and innovations not be lost in the debate over measures we've adopted. We include a simple process for adding promising new approaches to our fish and wildlife program.

Because this program was developed in cooperation with so many people from throughout the Pacific Northwest, we have great confidence in it. It reflects not only our best scientific knowledge of the salmon and its complex life, but also the unique values and perspectives of our people.

1985
United States and Canada sign Pacific Salmon Treaty, limiting ocean harvests of salmon and committing to fish enhancement efforts.



1988
Power Planning Council designates 44,000 miles of stream as protected from new hydropower development because they contain important fish or wildlife habitat.



A Long-term COMMITMENT to Fish and Wildlife

Saving the fish and wildlife of the Columbia River Basin is neither a recent, nor merely a regional, concern. It has been a long-term commitment of the United States, Canada and the sovereign Indian nations of the Pacific Northwest.

Nearly 150 years ago, the U.S. government negotiated treaties with many of the Northwest's tribes to secure for the United States millions of acres of tribal land. These treaties guaranteed tribes the right to fish, hunt and harvest the foods that provided them both physical and spiritual sustenance. These treaty rights have been consistently reaffirmed in federal court challenges.

Federal and Northwest state legislation has also specifically supported protection of and rebuilding efforts for Columbia River salmon since the first decades of this century. These laws called for limiting harvests of salmon, as well as creating hatcheries and other efforts to increase salmon production.

In 1980, Congress passed the Northwest Power Act, which included the directive to our Council to "protect, mitigate and enhance" Columbia Basin fish and wildlife, particularly the salmon, "which are of significant importance to the social and economic well-being of the Pacific Northwest and the Nation." The Act specifically ordered federal agencies that manage, operate or regulate both federal and non-federal dams in the Columbia River Basin to provide "equitable treatment" for fish and wildlife with the other purposes for which the dams are operated.

In 1985, the United States and Canada signed a treaty committing these two nations to reducing salmon fishing in the ocean and rebuilding salmon populations in both countries. Salmon from the Columbia River Basin, which are critical to the viability of both countries' fishing economies, received particular attention in that treaty.

In 1991 and 1992, the National Marine Fisheries Service declared three Columbia River Basin salmon runs to be threatened or endangered under the federal Endangered Species Act. Kootenai River white sturgeon and bull trout have also been petitioned for listing. The Endangered Species Act is one of the most rigorous pieces of federal legislation ever enacted to protect natural resources. Our hope is that implementation of this fish and wildlife program could make future listings of the Northwest's fish and wildlife unnecessary.

Actions We Call For

The Columbia River Basin Fish and Wildlife Program is a complex and ambitious set of actions aimed at rebuilding fish and wildlife populations without unmanageable disruptions in the Northwest's economy. If viewed geographically, it could be said that both the costs and the benefits of these measures are distributed throughout the entire Columbia River Basin. That was our goal: to improve the basin's natural world — its ecosystems — and share the cost of those improvements regionwide.

What follows are highlights of the actions we call for in this program. All of the actions are described in more detail in the complete 1994 Columbia River Basin Fish and Wildlife Program. To receive copies, see page 49.

The Northwest Power Planning Council reports monthly and annually on the status of implementation of these measures. Copies of our reports are also available. See page 49.

Systemwide Strategy

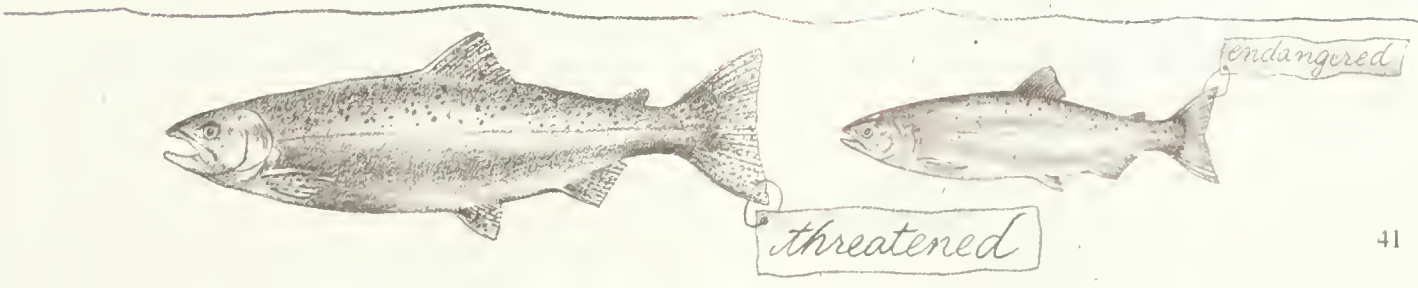
Goal

- A healthy Columbia River Basin, one that supports both human development and the long-term sustainability of native fish and wildlife species in native habitats, where possible.

Policies

- Periodically assess program measures to identify conflicts and assess tradeoffs in the Basin.
- Discourage opening new fish passage at natural barriers such as waterfalls because of the potential impact on established ecosystems.
- Develop an accounting system that clearly identifies the purpose and quantity of any release of water from any Columbia Basin storage reservoir.
- Negotiate with Canada to determine whether, and to what extent, U.S. electricity ratepayers and taxpayers could share funding

1991–1992
National Marine Fisheries Service lists Snake River sockeye as an endangered species, and Snake River spring/summer and fall chinook as threatened species.



with Canada to aid fish and wildlife that share habitat on both sides of the border.

- Contract with a management consulting firm to review and refine the overall structure of the program to ensure its effective implementation.
- Increase the amount of Bonneville's fish and wildlife project budget that is devoted to resident fish and wildlife. The Council considers 15 percent of that project budget an appropriate planning target for resident fish and another 15 percent for wildlife.

Strategy for Salmon

Goal

- Double annual salmon production in the Columbia Basin from approximately 2.5 million to 5 million adult fish.
- Accomplish the doubling goal with no appreciable risk to the biological diversity of fish populations.

Framework

- Rebuild Snake River salmon runs to the following numbers: 50,000 spring chinook, 20,000 summer chinook, 1,000 fall chinook.
- Evaluate salmon rebuilding actions in light of these six principles: 1) give priority to weak upriver runs; 2) cause no appreciable risk to biological diversity among or within fish populations, including resident fish; 3) take a total watershed approach to habitat and production improvements; 4) respect obligations to Indian tribes and other harvesters; 5) focus research on key uncertainties; and 6) use existing hatcheries unless the need for fish cannot be met with existing facilities.

Enhance salmon survival in the rivers

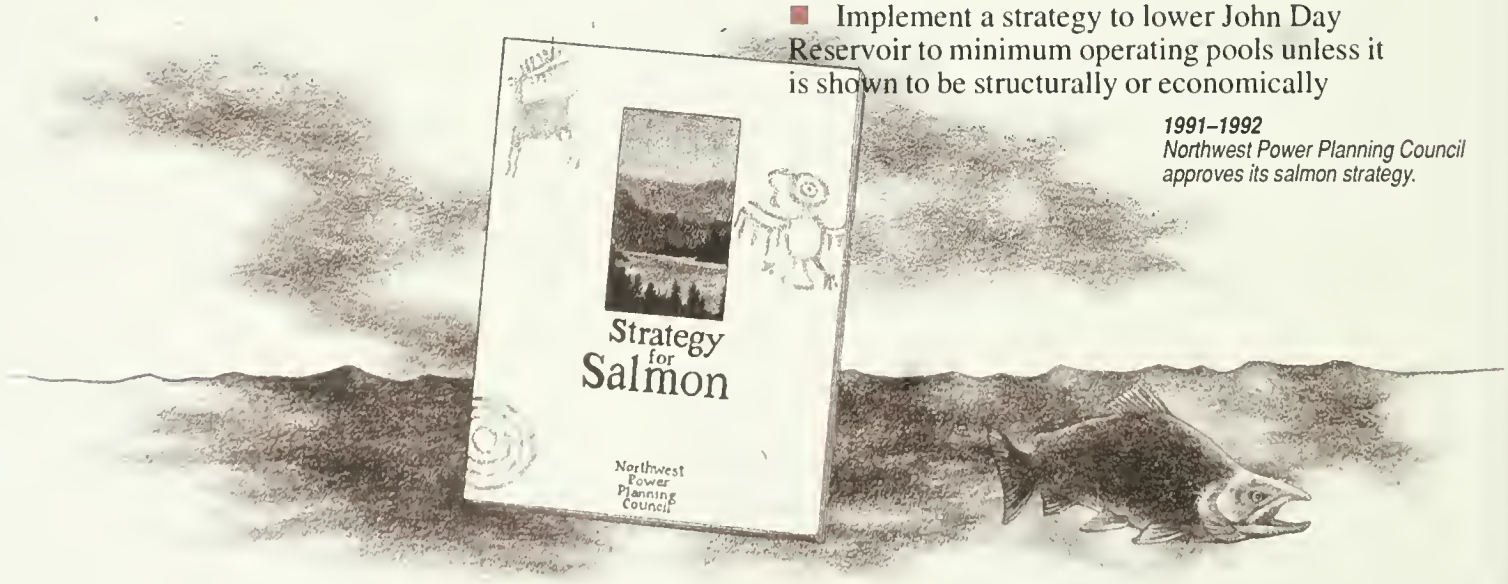
Increase river velocities to reduce fish travel time

Immediate actions

- Increase the speed of the Snake River during the spring salmon migration by lowering Snake River reservoirs to near minimum operating levels and providing additional water from Dworshak Dam and the upper Snake River.
- Increase water storage and flows in the Columbia River.
- Lower John Day Reservoir to minimum irrigation pool.
- Operate Brownlee Reservoir on the Snake River in a manner that assists adult salmon migrating upstream in spring and ensures that fall chinook redds (nests of eggs) remain wet.
- Evaluate energy exchanges and other alternatives for providing additional water in the Columbia to aid summer-migrating salmon.
- Evaluate increased spring and summer flows.

Intermediate actions

- Implement a Snake River drawdown strategy by April 1995, unless it is shown to be structurally or economically infeasible, biologically imprudent or inconsistent with the Northwest Power Act.
- Implement a strategy to lower John Day Reservoir to minimum operating pools unless it is shown to be structurally or economically



1991–1992
Northwest Power Planning Council approves its salmon strategy.

infeasible, biologically imprudent or inconsistent with the Northwest Power Act.

- Provide additional water storage and improve water-use efficiency in the Snake River Basin through water leases, use of uncontracted storage space and other measures.
- Review analyses and refine strategies to meet rebuilding targets.
- Secure options on power-generating resources that could reduce the load on hydroelectric dams, thereby ensuring greater flows for fish.
- Investigate other water-saving measures to help ease the demand for hydroelectricity.
- Coordinate river flow and temperature measures through the Council's Fish Operations Executive Committee, which includes policy-level representatives of the affected state and federal agencies and Indian tribes.
- Research and conduct an amendment proceeding on the relationship between increased flows, increased water velocity and salmon survival.
- Conduct a review of studies and select best actions to further improve mainstem survival.

Screen dams and spill water to protect juvenile fish

Immediate actions

- Improve and/or install screens to divert juvenile fish away from turbines at Snake and Columbia river dams.
- Spill water at dams to aid juvenile salmon migration until adequate turbine screens are in place.

Intermediate actions

- Evaluate, design and test extended-length screens at Snake and Columbia dams.
- Continue working on fish passage improvements at Bonneville Dam.
- Improve screening and bypass for both juvenile and adult fish at the Leaburg and Walterville hydroelectric projects in the Willamette River Basin. Similar actions are called for at the mid-Columbia public utility district dams.

Reduce losses to predators

- As an experiment, reduce the population of squawfish, a salmon predator, by 20 percent in the Columbia River.
- Evaluate and report on predation of salmon by seals and sea lions in the lower Columbia River.

Barge juvenile fish past dams

Immediate actions

- Accelerate improvements in barge transportation of juvenile salmon past Snake and Columbia dams, including use of cooler water, reduced densities of fish in barges and broader dispersion of the fish at release sites.

Intermediate actions

- Study improved fish holding and loading facilities, alternative fish collection sites and alternative transportation technologies.

Additional river actions

- Conduct water availability studies. Establish minimum instream flow levels. Deny new water appropriations that would harm fish. And acquire existing water rights on a "willing-seller" basis to improve fish flows.
- Enforce water rights and withdrawal limits at diversions, including measuring devices.
- Seek mitigation for lower water levels behind Dworshak Dam.
- Install juvenile PIT tag detectors at mainstem dams to better track migrating fish.
- Evaluate impacts of flow operations on resident fish at Hungry Horse, Libby, Grand Coulee and Dworshak dams.
- Study gas supersaturation resulting from increased flows.
- Evaluate modifications to bypass release systems at dams to reduce juvenile mortality and use of underwater sound systems to guide fish away from turbines.
- Report on the extent of predation and predator research in the mid-Columbia reservoirs.
- Evaluate feasibility of using video-based counting of adult fish passing dams. Institute if feasible.

- Evaluate adult fish losses between dams.
- Evaluate the effects of recent shad population increases.
- Continue to upgrade existing adult fish passage facilities.
- Upgrade the U.S. Army Corps of Engineers' Snake/Clearwater River temperature model with 1991 data.
- Evaluate methods for decreasing water temperature in fish ladders.
- Evaluate effects of zero nighttime flow.

Improve harvest management

- Continue to limit harvest to allow more adult fish to return to the Snake River to spawn.
- Prohibit commercial harvest of sockeye below the confluence of the Snake and Columbia rivers to protect endangered Snake River sockeye.
- Reduce overall harvest rates on Snake River fall chinook to 55 percent of the run.
- Limit non-treaty river harvest of spring chinook to about 4 percent of the upriver run.
- Prohibit commercial fishing for summer chinook until rebuilding allows it, continuing the ban that has been in place since the mid-1960s.
- Substantially reduce Canadian harvest of U.S. salmon, and end the high seas drift-net fishery.
- Lease or buy Columbia River commercial fishing licenses and develop a compensation plan for fishers.
- Demonstrate and evaluate harvest alternatives, such as live-catch, known-stock and terminal harvest fisheries.
- Review sport fishing regulations and adopt catch-and-release rules where appropriate. Account for and report on incidental harvest of salmon in other fisheries. Increase law enforcement and public education to deter illegal fishing.
- The National Marine Fisheries Service should report each year on harvest and escapement of various Columbia Basin salmon stocks.
- Develop and implement genetic stock identification program.

Improve hatchery practices/ protect fish in the wild

- Improve hatchery practices and make them consistent throughout the Columbia Basin so that hatchery fish are better able to survive in the natural environment and do not harm fish that spawn in streams.
- Audit hatchery practices throughout the basin.
- Develop brood stock technology and other emergency measures to save seriously depleted salmon runs.
- Collect additional information on naturally spawning salmon populations, such as population status, life history and other data.
- Develop a process for screening proposed artificial production projects for meeting National Environmental Policy Act requirements.
- Pursue experiments in natural and artificial salmon production to measure the relative success of each approach for rebuilding depleted populations.
- Study the juvenile fish carrying capacity of the Columbia River mainstem and estuary to ensure that hatchery releases are not exceeding that capacity.
- Continue to involve appropriate genetics experts in discussions of how to sustain the diversity of salmon runs.
- Develop appropriate recommendations for protecting and enhancing runs of sockeye, coho and chum salmon, sea-run cutthroat trout and lamprey in the Columbia River Basin.
- Identify populations of salmon that spawn in streams.
- Encourage establishment of a Pacific Northwest "biodiversity institute."
- Analyze existing data on basinwide trends in hatchery fish survival.
- Mark salmon from hatcheries that have high rates of straying salmon.
- Determine the feasibility of marking all hatchery fish.
- Plan and construct spring chinook trapping facilities on Grande Ronde River tributaries.
- Demonstrate portable fish holding and juvenile acclimation facilities for adult fish.
- Secure 100 cubic feet per second water

right at Ringold Hatchery in Washington.

- Develop feasibility study for reintroduction of sockeye into appropriate production areas.
- Research improvements in cryopreservation technology and develop applications to preserve salmon eggs for future use.

Protect and restore habitat

- Give highest priority to habitat protection and improvement in areas of the Columbia Basin where there is low productivity or low survival of fish.
- Focus habitat improvement projects on approaches that involve local landowners and governments.
- Develop habitat performance standards that acknowledge and incorporate local characteristics for each watershed in the basin.
- Expand the cooperative approach to total watershed salmon habitat and production improvements.
- Complete prioritized list of tributary screening and passage projects for expeditious action. Install by end of 1995.
- Use private sector as well as public resources to ensure timely construction and installation of priority screens and water measuring devices at water diversions in salmon rearing areas.
- Inspect all underwater diversions in the mainstem Columbia and Snake rivers to determine whether screens that deflect fish from the intakes are installed and operating.
- Identify and protect permanent riparian management areas. Promote revegetation where it is needed.
- Give high priority to voluntary property easements as a means of protecting salmon habitat and low priority to government acquisition of property.
- Review and, if necessary, improve water quantity and quality standards and mining laws to promote salmon productivity.
- Land managers should pay special attention to insect infestations that may kill trees, lead to catastrophic fires and, in turn, result in increased erosion that damages salmon habitat.
- Consider expanding the Columbia River Estuary Bi-State Study on water quality to include all of the Columbia River Basin.
- Study the feasibility of installing devices to control the temperature of water discharged from Cougar and Blue River dams on the McKenzie River and Detroit Dam on the Santiam River.
- Revise livestock management plans on federal lands for riparian enhancement.
- Secure funding and select watersheds for water conservation demonstration projects.
- Complete a regional assessment of water availability in the Columbia River Basin.
- Provide power or reimbursement for power costs for Umatilla Basin Project water exchange.
- Establish funding for state coordinators to implement watershed management.
- Streamline procedures for funding priority habitat projects.

Monitor and evaluate

- Conduct independent and scientific review of the amended fish and wildlife program, including its cost-effectiveness and biological impacts.
- Develop analytical tools to respond to critical uncertainties.
- Publish results from studies performed through this program. Conduct an annual symposium on these results.
- Implement Coordinated Information System.
- Develop project data base to track projects.
- Determine range, limiting factors, spawning and rearing habitat, genetic structure and population status of Snake River fall chinook and develop experimental design for supplementing Snake River fall chinook.
- Monitor life history and survival of Snake River spring, summer and fall chinook.
- Submit schedule and work plan for development of rebuilding schedules for other regional stocks.
- Submit final list of recommended populations for biodiversity base line.

Economic mitigation

- Evaluate adverse economic effects of salmon recovery and identify funding sources for mitigation of economic consequences of salmon enhancement efforts.

Strategy for Resident Fish and Wildlife

Goal

- Where feasible, recover and preserve the health of native resident fish injured by the hydropower system in their natural habitat. Where this is not feasible because of irreparable habitat loss or damage, mitigate for such losses at other sites in the basin.
- Achieve and sustain levels of habitat and species productivity in order to fully mitigate wildlife losses that resulted from the construction and operation of the federal and non-federal hydroelectric system.

Resident fish and wildlife policies

- Encourage development of model watersheds to coordinate resource management to benefit resident fish as well as salmon.
- Develop safeguards for natural and artificial production of resident fish in order to conserve genetic diversity, and minimize genetic and ecological impacts of hatchery fish on wild and naturally spawning species.
- By 1995, assess resident fish losses — and gains — related to construction and operation of each hydropower facility throughout the Columbia River Basin.
- Assign highest priority for mitigation financed by ratepayers to weak, but recoverable, native fish populations injured by the hydropower system.
- Rebuild native species in native habitats, where feasible.

Protect and restore habitat; improve production

- Continue to build hatcheries, introduce resident fish in areas where dams block salmon and steelhead, and improve habitat.
- Identify specific projects to improve survival of bull trout and sturgeon.
- Study kokanee in northern Idaho's Lake Pend Oreille to determine the cause of their decline.

Mitigate hydropower impacts

- Develop proposals for operational changes at Hungry Horse and Libby dams in Montana to aid fish spawning and rearing.
- Determine whether adding three new generators at Libby Dam on the Kootenai River in Montana would allow Lake Koocanusa to be held at consistently higher levels than currently are possible and improve flows for fish below the dams.
- Allocate wildlife mitigation costs to the various purposes of each dam, such as hydropower, flood control, irrigation, navigation, and so on.
- Finance mitigation through agreements between Bonneville and each state.
- Negotiate interim, five-year wildlife mitigation agreements for Idaho and Oregon by February 1994 and long-term agreements for these states by 1997. In the absence of these agreements, the Council will select and approve mitigation projects for funding in a given fiscal year.
- Determine by July 1994 the amount of credit to be given for existing wildlife mitigation undertaken on behalf of federal hydropower projects.

Major Accomplishments

Before 1982, the year the Northwest Power Planning Council created the first Columbia River Basin Fish and Wildlife Program, the region lacked a coordinated response to the decline of fish and wildlife populations. Now it has one. Our program is comprehensive. It includes measures designed to improve fish and wildlife survival throughout the basin. More than 600 projects have been initiated. Here is a sampling:

At the Dams

- The U.S. Army Corps of Engineers is installing diversion screens in front of the turbine intakes at federal dams on the Columbia and Snake rivers, improving smolt collection and transportation facilities, and improving ladders for adult fish. While bypass systems were being built at the dams, water — and fish — were spilled over the tops of dams to prevent their being forced through dam turbines.
- To speed salmon migration, river flows were boosted in the spring and early summer by increasing water storage in winter.
- The impact of barge transportation on salmon and steelhead is being studied, and changes are being made to improve survival of these fish. Work also focused on developing new and improved treatments to prevent the spread of viral diseases among juvenile fish during barge transportation.
- In September 1988, we adopted our protected areas rule into the fish and wildlife program. This rule sets aside some 40,000 miles of streams in the Northwest as off limits for construction of new hydroelectric dams because of important fish or wildlife habitat. We continue to work with the Federal Energy Regulatory Commission to assess new hydropower projects and incorporate protected-area designations into Commission decision-making.

In the Habitat

- Major water withdrawals in the Columbia River Basin were surveyed and modifications recommended or screens are to be installed at those withdrawals that did not meet fish-protective standards.
- The impact on juvenile salmon from river predators such as squawfish was studied, and various methods for controlling the predator population were proposed. A bounty fishery for squawfish and other techniques were implemented.
- Numerous projects focused on improving the quality of habitat for juvenile salmon and steelhead, with the goal of boosting fish production in the wild.
- Various projects in Washington, Idaho, Montana and Oregon set aside habitat for wildlife to mitigate the impact of hydroelectric dams. These projects affected a wide variety of animals, from sharp-tailed grouse and pygmy rabbits to elk, deer and eagles.

Fishing

- In response to a measure in our program, Oregon and Washington reduced harvests of fall chinook to less than 55 percent of the run in those fisheries that affect Snake River fall chinook, a threatened species.
- The combined fisheries law enforcement activities of Washington, Oregon and the Columbia River Inter-Tribal Fish Commission were increased to protect fall chinook salmon from illegal harvest as they returned up the Columbia and Snake rivers in 1993.

At the Hatcheries

- Numerous projects focused on improving hatchery practices and constructing an experimental hatchery for salmon and steelhead. In conjunction with a new hatchery on the Umatilla Indian Reservation, salmon are now swimming in a section of the river where they had been absent for more than 60 years.
- Five hatcheries have been constructed to improve populations of resident fish that were harmed by dams. Two produce kokanee — at Sherman Creek and the Spokane Indian Reservation — for release in Lake Roosevelt and Banks Lake in Northeastern Washington. These are managed jointly by Indian tribes and the state of Washington. Another hatchery, at Bonners Ferry in northern Idaho, produces sturgeon for release in the Kootenai River. The Colville Tribal Hatchery on the Columbia near Chief Joseph Dam produces trout for release in lakes on the Colville reservation, and a hatchery at Cabinet Gorge on the Clark Fork River in northern Idaho produces kokanee.

To Order

This is the overview of the 1994 Columbia River Basin Fish and Wildlife Program. The full program, which contains the complete program measures, is also available. To order, please call the Council's central office, 503-222-5161, or toll free 1-800-222-3355.

94-1 1994 Columbia River Basin Fish and Wildlife Program Overview
94-2 1994 Columbia River Basin Fish and Wildlife Program
Monthly Salmon Strategy Implementation Status Reports

Note: Additional copies of both the overview and the complete program will be available at many public libraries.

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